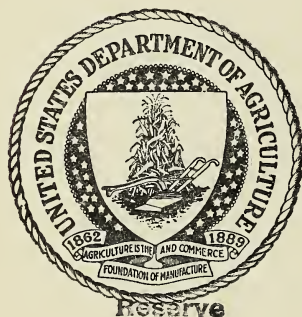


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THE DEPARTMENT OF AGRICULTURE.

CORRESPONDENCE.

UNITED STATES DEPARTMENT OF AGRICULTURE,
COMMISSIONER'S OFFICE.
Washington, D. C., November 8, 1887.

SENATOR: I have the honor to transmit herewith, in response to your request, certain information covering the conduct of affairs of this Department since January 1, 1884. I desire to add a word in explanation of this statement. It has been found impossible to make up this report in any prescribed form, for in a Department having such an organization as this one, the records do not give information which enables me to follow more than the general line of your inquiry, or, rather, the general character and scope of the investigation imposed upon your committee. The questions you propound are intended to apply more particularly, as I interpret them, to routine clerical work, such as the auditing and adjusting of accounts; the consideration of claims against the Government; the granting of pensions or of letters patent, etc. In so far as there is such routine work here, I have endeavored to follow your request so far as allowed by incomplete data; but it should be remembered that, in general, the lines between the different divisions of the Department are not strictly drawn, it often requiring the operation of many divisions to complete a single question, and no public interest would be subserved in attempting to record the exact status of any one question at any particular time, if, indeed, a systematic record could be arranged at all. I have, therefore, made this report in a narrative form, and trust that it will furnish the information desired.

In addition to the divisions which are reported below, as such, there are the following officers and employes whose duties will be suggested by their titles, and who report directly to the Commissioner: The chief clerk, who is also superintendent of building; the engineer, and his assistants; the engraver; the draughtsman; the superintendent of the folding-room, and the curator of the museum and one assistant. No regular record is kept of the duties performed by these employes, nor of anything which would aid your committee in its work, with the exception of the time-roll. Other branches of the Commissioner's office proper will be found referred to at length below. They are the disbursing office, the librarian, the stationery room, the dairy branch, and the Congressional correspondence branch.

Very respectfully, your obedient servant.

NORMAN J. COLMAN,
Commissioner of Agriculture.

Hon. F. M. COCKRELL,
United States Senate.

DIVISION OF ACCOUNTS, ETC.

There was no business of importance pending in this division on the 1st day of January, 1884, all business being promptly disposed of as presented.

The principal business of this division is to make up the pay-rolls, pay the employes of the Department, receive, audit, correct, and pay all bills of expense incurred in the transaction of the business of the Department, to keep the books and records, and make up and present the accounts to the United States Treasury Department for final settlement. Keeping an account of Government property, keeping a record of appointments, promotions, and discharges of employes; also of proposals, contracts, leases, etc.; of receipts of articles from express companies; orders for supplies purchased by the Department, requisitions for printing, verifying the United

States Treasurer's account with this Department, and all other financial matters pass through this division.

The following is a statement of the amount of business received, transacted, and disposed of in this division during the calendar year 1884:

The number of accounts received, audited, corrected, and paid was.....	1,992
Number of requisitions drawn on the Secretary of the Treasury.....	57
Number of requisitions on the Public Printer.....	136
Number of articles received by express.....	276

There was no business pending on January 1, 1885, excepting the current business of the division that accumulates from day to day.

The following is a statement of the amount of business received, transacted, and disposed of in this division during the calendar year 1885:

The number of accounts received, audited, corrected, and paid was.....	2,367
Number of requisitions drawn on the Secretary of the Treasury.....	57
Number of requisitions on the Public Printer.....	131
Number of articles received by express.....	227

There was no business pending on January 1, 1886, excepting the usual current business of the division.

The following is a statement of the amount of business received, transacted, and disposed of in this division during the calendar year 1886:

The number of accounts received, audited, corrected, and paid was.....	2,548
Number of requisitions drawn on the Secretary of the Treasury.....	76
Number of requisitions on the Public Printer.....	112
Number of articles received by express.....	370

There was no business pending on January 1, 1887, excepting current business.

The following statement shows the amount of business received, transacted, and disposed of in this division during the calendar year 1887, from January 1 to March 1:

The number of accounts received, audited, corrected, and paid was.....	480
Number of requisitions drawn on the Secretary of the Treasury.....	13
Number of requisitions on the Public Printer.....	16
Number of articles received by express.....	110

The average number of clerks in this division in 1884, 1885, 1886 was 5; from January 1 to March 1, 1887, 6, as follows: Chief of division, 1 book-keeper, 1 auditing clerk, 1 property clerk, 1 assistant to disbursing clerk, and since January, 1887, 1 additional assistant.

The maximum and minimum amount of business transacted and disposed of by any one clerk in this division can not be definitely given, it being all transacted in one room and intermingled to a great extent. No independent account has been kept of the business performed and disposed of by each employé, for the reason that it would require considerable additional time and useless labor by an already overworked division, as the records of this office show the amount of business transacted daily in this division.

The absence from duty of the employées has been reported, but no copy has been filed in this division. I will say, however, that they have been attentive, conscientious, and efficient, and no work has been done by proxy.

The business transacted in this division is largely in purchasing and paying for supplies and keeping the books and rendering the accounts in connection therewith, there being twenty-three distinct appropriations for this Department, and separate accounts have to be kept, requiring great care, accuracy, and labor in preparing, auditing, and entering the vouchers in the books and accounts.

The method of obtaining funds and paying bills is as follows, to wit: When salaries are to be paid or supplies paid for, an estimate is made of the amount that will be required from each appropriation, and a requisition is drawn on the Secretary of the United States Treasury for such amounts, and when it passes the Treasury Department a warrant is issued and placed to the credit of the Commissioner of Agriculture on the books of the United States Treasury.

When supplies are needed for the Department a requisition is made by the Commissioner for whatever may be required, and it is presented to this division; if there is an appropriation available for the purchase an order is issued for the same, they are delivered to the division requiring them, and the bill presented to this division in duplicate, and are referred to the chief of the division for which they were purchased; he certifies that the goods have been received and legitimately applied, and the prices just and reasonable, and returns it to this division; it is then referred to the Commissioner for his approval, and when approved is returned here, audited, and, if correct, is paid either by check drawn on the Treasurer of the United States or by cash.

drawn from him for that purpose, and when so paid is entered in cash book, posted in the journal to the appropriation to which it belongs, and at the end of the quarter made up with other accounts of the Department and transmitted to the United States Treasury Department for final settlement.

LIBRARY.

The library consists of scientific works on agriculture in all its various branches. Subjects.—Agriculture proper, botany, chemistry, entomology, horticulture, microscopy, pomology, statistics, etc.

Many of the publications are exchanges from different scientific societies in this and foreign countries, and from all the Departments of the Government; others are subscribed for or purchased.

The librarian receives all mail matters pertaining to the library, enters this in a daily entry-book, and distributes it in the different divisions as it is required. A separate entry-book is kept for these divisions, wherein all matter pertaining to each is entered daily. Such matter as is not filed in these divisions is kept in the library, newspapers and pamphlets alike. Of the first many are clipped, and the matter thus extracted is put in scrap-books. Each pamphlet, book, or paper is stamped with the library stamp, which bears date of receipt. All publications are prepared for binding by the librarian twice per annum. This consists in stripping, paging, and ticketing, with instructions on each ticket as to the manner of binding, and a pattern is attached to each volume. A duplicate list of these books is made, one of which goes to the bindery and the other is kept in the library for verification when they are returned.

There were sent to the bindery :

Year.	Volumes.	Volumes as patterns.
1884	264	75
1885	221	63
1886	365	78
1887	294	70

When these books are returned from the bindery the librarian examines each volume and tickets them and enters them on the card catalogue of the library. Every book received is catalogued on two cards, one under the author's name, the other under the subject-matter. These cards are all prepared by the librarian. All requisitions for the purchase of books or for subscriptions are made out by the librarian, subject to the approval of the Commissioner, and must be certified to by the librarian before the Commissioner will sign them for purchase and payment. A record of these requisitions is kept in the library as well as in the disbursing division.

Books loaned to employes for their work are receipted for on a printed card. References required must be furnished by the librarian. All correspondence for purchases, subscriptions, and exchanges devolves on the librarian. This is the routine and daily duties of the librarian. Three mails are received daily, and these are handled by the librarian and her assistant and properly entered, stamped, and distributed.

There are employed in the library only two persons, the librarian and a clerk detailed to assist in the work. In 1884, up to March 31, 1885, a \$1,600 clerk was thus detailed and required to prepare and assist in arranging the card catalogue which had previously been commenced by the librarian. From March 31 to December 8, 1885, no one but the librarian was employed in the library. On December 8, 1885, a messenger at \$660 per annum was detailed to assist the librarian, whose duty is to carry books and papers to and from the different divisions, examine and clip newspapers, to prepare scrap-books, and arrange books in the cases, etc. This employe continues on duty up to present date; i. e., March 1, 1887.

There were received in the library :

Year.	Periodicals and books.	Papers.
1884	3,379	7,603
1885	4,430	8,340
1886	3,832	8,530
1887 (to March 1)	620	850

These are all entered on its books, and when completed such as are to be bound are gathered together and prepared for binding. Preparation consists in taking off all superfluous leaves and covers, paging, and ticketing with instructions for binding. This work is always done by the librarian. All letters on the subject of books and their contents are referred to the librarian, who furnishes the information desired.

STATIONERY AND FILE ROOM.

The records of the file and stationery room were systematized about the 1st of November, 1885. Categorical replies can not, therefore, be made to some of the inquiries relative to the business prior to that date. So far as practicable they will be found in the following report, together with the full record since that time for the periods named.

The "duties devolving upon the room" are:

(1) To keep an accurate account of all stationery and materials received for the use of the Department, and to distribute them to the various divisions, in accordance with the orders of the Commissioner or the chief clerk, upon proper requisitions.

The amount of stock on hand (as well as that on hand March 1, 1887) may be held to represent in part the "amount of work on hand pending and undisposed of" at their respective dates.

(2) To receive, copy, record, and mail all letters going from the Department that may be sent to the room for that purpose.

The record is complete for the work under this head for the periods named, and is as follows:

LETTERS COPIED AND MAILED.

From January 1, 1884, to December 31, 1884.....	3, 299
From January 1, 1885, to December 31, 1885.....	3, 079
From January 1, 1886, to December 31, 1886.....	3, 346
From January 1, 1887, to March 1, 1887	689
Total.....	10, 405

(3) To receive, record, brief, and file all letters coming to the Department that may be sent to the room for that purpose.

This work is completed each day, none lying over, except the last indexing of the temporary file, which is unimportant as to time, because they are filed and arranged alphabetically every day for ready reference.

The record of work under this head does not go back of the period heretofore referred to. From that time forward, say—

	Letters.
From November 1, 1885, to December 31, 1885.....	2, 278
From January 1, 1886, to December 31, 1886.....	3, 336
From January 1, 1887, to March 1, 1887.....	1, 340
Total.....	6, 954

(4) To make replies to such letters, on special subjects, as may be sent to the chief of that room for that purpose.

The work under this head has been—

	Letters.
From November 1, 1885, to December 31, 1885.....	83
From January 1, 1886, to December 31, 1886.....	390
From January 1, 1887, to March 1, 1887.....	144
Total.....	617

(5) To systematically arrange, for convenient reference, all letters and documents that may be sent to the room.

The record of work under this head is not anterior to November 1, 1885:

From November 1, 1885, to December 31, 1885.....	3, 046
From January 1, 1886, to December 31, 1886.....	8, 088
From January 1, 1887, to March 1, 1887.....	2, 257
Total.....	13, 391

(6) To receive, prepay, and mail all books, pamphlets, letters, and seeds for the foreign mails, keeping a daily account of the Post-Office stamps which may be thus

used to supply the employes of the Department with postage stamps, postal cards, etc., as they may request. The number of packages, letters, etc., thus received is as follows :

From November 1, 1885, to December 31, 1885.....	674
From January 1, 1886, to December 31, 1886.....	2,925
From January 1, 1887, to March 1, 1887.....	533
Total	4,132

There have been but two employes regularly in the room, besides the chief, since November 1, 1885.

The time record is as follows: From November 1, 1885, to December 31, 1885, one clerk was present all the time, except one day. During the calendar year of 1886, she had her annual leave of 30 days, and a furlough of 15 days without pay. From January 1, 1887, to March 1, 1887, she lost no time.

The other clerk, from November 1, 1885, lost 2 days. During the calendar year of 1886 she had her annual leave of 30 days and, besides, lost 33½ days. From the 1st of January, 1887, to March 1, 1887, she lost no time.

From November 1, 1885, to December 31, 1885, the chief lost no time. During the calendar year of 1886 he had the annual leave of 30 days and lost 2 days. From January 1, 1887, to March 1, 1887, excused for 6 hours.

No substitutes have been employed, but during the absence of both the clerks one clerk was detailed to the room for a short time.

The work of the employes in this room consists of indorsing, filing, indexing, and recording letters received and sent, and in copying letters from the original copy books into larger volumes. This last work appears to me unnecessary, and at the close of the present volume it will be discontinued, and the clerk detailed for other duties.

In regard to the "maximum and minimum amount of business transacted and disposed of," it is difficult, from the nature of the business, to make categorical reply, as the work and its amount varies so irregularly, with the amount of incoming and outgoing mail matter. Occasionally, though very seldom, some of the work of one day will lap over to the next, but there is practically no accumulation of "untransacted business."

"The methods of transacting business" are simple, the operations being now thoroughly systematized, the daily work proceeding regularly without friction, and is in detail as follows:

The first thing in the morning is to index, in the several copy books, the letters which have been copied the previous evening; then to examine the letters placed in the file-room box, stamp them with the date of their receipt, read, and divide them for their respective "temporary" and "jacketed" files. The temporary are then filed and properly indorsed, and the jacketed are briefed and recorded in different record books, by their subjects and by the names of the writers. After the letters are assorted, the chief distributes supplies as they may be called for, answers the letters sent to him for such action, copies such documents on the type-writer as the chief clerk may direct, copies the outgoing letters and mails them, prepares letters and packages for the foreign mail, etc. Much miscellaneous work is also done, such as indexing the annual reports and other publications of the Department, etc.

I will add that the first inventory of the supplies in this room was made in November, 1885, and since then, at half-yearly intervals, an account of stock on hand has been taken. By comparison of this with the books of receipts and deliveries the actual amount in hand can at any time be taken.

DAIRY DIVISION.

This division was organized in May, 1885. The procurement of the post-office addresses of all who were engaged in dairying on a large scale, particularly the associated dairymen, was the first work to engage attention. This was done by correspondence with State agents, secretaries of dairy associations, secretaries of State granges, also of county granges in some States, dairy commissioners, secretaries of boards of trade in the principal cities, and with business firms in various places. Information was likewise sought, by the issuance of circulars, respecting the manufacture of oleomargarine and like compounds. Preparatory circulars were sent to all the addresses that could be procured, setting forth the object of the undertaking and calling for suggestions respecting its direction.

The prime object of the inquiry was to obtain facts and data sufficient to enable the computation to be made of the several averages (since a complete census was impossible) of the yield per cow per day in milk, butter, and cheese, and the average

values per cow in the different States; also the average number of pounds of milk required for the pound of butter or cheese, and the cost of manufacture. Whilst awaiting these returns, circulars were transmitted to the several agricultural colleges and experiment stations of the country, with a view to inaugurate a medium of interchange of valuable information pertaining to agriculture. Circulars likewise were sent to these institutions, suggesting the method of cultivating certain foreign wheats forwarded to them by this Department, requesting an analysis of their products, to be compared with the analysis of the original parcels made by the chemist of the Department of Agriculture.

To determine the various averages of dairy products a vast amount of mathematical calculation was requisite to insure accuracy of details, the work of each clerk being verified and compared by another. A report of all the work, by tables, of results for the several dairy States was prepared, but owing to the fact that the returns from some States, and those, too, that possessed peculiar advantages, have been too few to warrant a reliable statement of averages for those States, the publication has been withheld, pending efforts to secure more information through the methods above set forth.

The work in this division has been of such a nature that no special allotment could be made to any one clerk. Four ladies have been occupied in addressing envelopes, sending out circulars, indexing returns circulars, briefing the accompanying remarks, working out and tabulating the several averages by counties and States, resulting in the publication of a report upon "The Condition of Dairying in the Dairy States." Some 3,500 copies of this report have been distributed.

The returns of the dairy season of 1886 are now (April, 1887) being computed, and circulars have been sent to those who prosecute winter dairying, with the view to institute a comparison with summer dairying.

Correspondence upon dairy matters has received full attention, also upon miscellaneous subjects that have incidentally reached the writer.

DIVISION OF CONGRESSIONAL CORRESPONDENCE.

All requests for seed, cuttings, and reports from Senators and Representatives are sent to this division and filled as promptly as possible. There are ten regular clerks, and during the busy season two additional. From the time a letter is received from the Commissioner or chief clerk until the business is completed it passes through several hands; first, the name and address to whom the seed is to be sent is written on a blank form for the purpose, then it is charged on the books, after which the franks and postals are written, and the letter is returned to the Senator or Representative as having been complied with.

The miscellaneous orders for seed are very numerous, and are here attended to, but no books are kept, the record being completed by the superintendent of the seed-room.

A set of books showing the amount of seed credited to each Senator and Representative, and the account of seed drawn and to whom sent, are regularly kept, and on July 1 of each year a statement of the business of the year is given to the Commissioner.

On June 1, 1885, there was a large quantity of unfilled requests on hand, but it was then too late in the season to fill the orders; since then all business has been disposed of in a reasonable time.

Books were opened on October 23 for a record of reports sent from this division, and from that date up to April 1 5,800 annuals and bulletins were sent.

The amount of seed sent to Senators, Representatives, and Delegates from July 1, 1884, to July 1, 1885, will be found in the following statement:

Seed.	Number.	Seed.	Number.
Vegetable	2, 219, 636	Sorghum	13, 056
Flower	426, 364	Grass	13, 321
Tobacco	149, 525	Clover	1, 503
Wheat	22, 483	Cotton	27, 987
Oats	815	Tree	624
Barley	73	Turnip	422, 974
Corn	829	Millet	67
Rye	11	Buckwheat	51

From July 1, 1885, to July 1, 1886, the seed in the following statement were distributed :

Seed.	Number.	Seed.	Number.
Vegetable	2, 728, 671	Sorghum	7, 391
Flower	272, 580	Grass	14, 508
Tobacco	124, 902	Clover	379
Wheat	10, 800	Cotton	5, 207
Oats	3, 034	Tree	907
Barley	99½	Turnip	338, 281
Corn	8, 982	Millet	143
Rye	14½	Sugar beet	12, 278

No statement for 1886 to March, 1887, can be given, as no record is made until July 1, the business for the year ending at that time.

No account is kept in this division of the business disposed of by each employé, as such would be impracticable.

BUREAU OF ANIMAL INDUSTRY.

As it will be very difficult, if not impossible, to answer your inquiries satisfactorily in the exact order in which they are arranged, a slight deviation has been made in this respect in order to convey a true idea of the nature of the work of this Bureau.

Character of the work of the Bureau of Animal Industry and the methods adopted for its performance.

This Bureau was established by act of Congress May 29, 1884, and organized June 1, 1884.

The work placed in its charge may be divided as follows:

1. Investigations and reports upon the condition, protection, and use of the domestic animals of the United States.

2. Investigations and reports as to the causes of contagious, infectious, and communicable diseases among domestic animals, and the means for the prevention and cure of the same.

3. Collection of such information upon subjects embraced in 1 and 2 as shall be valuable to the agricultural and commercial interests of the country.

4. Examination and reports upon best methods of treating, transporting, and caring for animals, and the means to be adopted in suppressing and extirpating pleuro-pneumonia and to prevent its spread.

5. Investigation, suppression, and extirpation of pleuro-pneumonia in accordance with the rules and regulations of the Commissioner of Agriculture, prepared under section 3 of the act of May 29, 1884, this work being done by means of inspection, quarantine, slaughter of affected animals, and disinfection of buildings, premises, and vehicles of transportation.

6. Original scientific researches, conducted at experimental station and laboratory at Washington, in relation to the subject-matter mentioned above.

7. Direction and management of quarantine stations for imported cattle.

8. Clerical work of the Bureau.

The plan pursued in carrying on the above-described work is as follows:

At the beginning of the year, and from time to time, the chief of the Bureau, after consultation with the Commissioner of Agriculture, selects subjects embraced in divisions 1, 2 and 3, to be investigated and reported upon, and competent persons are appointed by the Commissioner to make such investigations. The employés so selected are generally well-known men, who have made a reputation in the particular subject-matter they are appointed to investigate, and whose business connections give them unusual facilities for obtaining information. They reside in various parts of the United States, and in the course of their investigations they are required to travel from place to place in order to properly make the investigations required of them. When they have completed the work given them they forward their report to the chief of the Bureau, who, if he approves the same, submits it to the Commissioner. This report, if of sufficient value to the country at large, is then incorporated in the annual report of the Bureau of Animal Industry and transmitted to Congress as required by law.

The method adopted for carrying on the work specified in division 5 is as follows:

The Commissioner of Agriculture, upon the recommendation of the chief of the Bureau, details inspectors to investigate in regard to the prevalence of pleuro-pneumonia in localities where it is believed to exist. These inspectors report weekly or oftener to the chief of the Bureau, giving a detailed statement of the herds, animals, premises, and condition of the same, together with the names of owners and date of inspection. Wherever pleuro-pneumonia is discovered it is at once reported to the chief of the bureau and to the chief inspector of the State in which the discovery is made, and a temporary quarantine is placed on the herd in which it is found. The chief inspector immediately visits the herd for the purpose of verifying the diagnosis of the inspector, and reports his conclusions to the Bureau. As an external diagnosis for pleuro-pneumonia is a subject of much difficulty and often inconclusive and unsatisfactory, the chief of the Bureau is frequently compelled to personally verify the diagnosis of the chief inspector. When he is satisfied of the actual existence of the disease the herd is placed in permanent quarantine. The diseased animals are purchased and slaughtered, or are condemned, appraised, and slaughtered by co-operation with State authorities. As soon as the herd has been disposed of the premises and buildings are thoroughly disinfected and the quarantine raised. Meanwhile an inspector is directed to ascertain how the disease was communicated to the herd and to trace the animal or animals introducing it to the premises from which they came.

When pleuro-pneumonia is found in more than one herd in any locality a quarantine of the locality is established, the size of the district quarantined being fixed according to the recommendations of the chief of the Bureau. Notice of the quarantine is certified to the governor of the State in which the district lies, and is published in newspapers designated by the Commissioner, and notice is sent to all transportation companies doing business in such district of the declaration of the quarantine, and they are forbidden to transport any animals of the kind unless the same are examined and certified by an inspector of the Bureau to be free of, and not to have been exposed to, pleuro-pneumonia. The strictest scrutiny is maintained to prevent any violation of the quarantine and to guard against the spread of pleuro-pneumonia while it is being extirpated in the quarantined district. Whenever the chief of the Bureau is satisfied that the disease has been extirpated, the several quarantines established are removed and notice of the same given to all parties interested.

In carrying on the foregoing work reports are sent in weekly or oftener to the chief of the Bureau, and no inspector takes any action unless authorized by the chief of the Bureau after consultation with the Commissioner. These instructions are made from time to time or mail or by telegraph, as the circumstances in each particular case render necessary.

All of the business connected with this branch of the work is received from the inspectors by the chief of the Bureau, and is acted upon and finally disposed of by him after consultation with the Commissioner, and goes through no other hands.

Experimental work—Division 6.

The experimental work of the Bureau relating to subject-matters embraced in all of the foregoing divisions is carried on at the experimental station of the Bureau, located in the suburbs of this city, and at the laboratory in the Department building. These are in charge of competent professional officers who conduct the experiments. The subjects and nature of the experiments are selected and indicated by the chief of the Bureau, who maintains a general supervision during their progress. The results of these experiments are reported by the officers in charge, and these reports are incorporated in the annual report of the work of the Bureau to Congress.

Quarantine stations for imported cattle.

The quarantining of cattle from foreign countries, formerly in charge of the Treasury Department, has by act of Congress been placed under the control of this Department, and added to the duties of the Bureau of Animal Industry.

These quarantine stations are four in number, and are located at Littleton, Mass., Garfield, N. J., Patapsco, Md., and San Francisco, Cal. The importers of cattle are requested to take out a permit stating the number of cattle to be imported and the ports of shipment and landing. This secures for them accommodations at the quarantine station. On the arrival of vessels having cattle on board, the collector of customs notifies the superintendent of the station at that port, and the superintendent meets the vessel on arrival, examines and takes charge of the imported cattle, and places them in quarantine at the station for a period of ninety days. After this period, if it is found that these animals are free from all disease, they are discharged from quarantine, and the importers are permitted to ship them wherever they desire. Full reports of this work, containing the name of the vessel, importer, number, and breed of each lot of imported cattle, and the place and person to which they are finally

sent, is forwarded to the Bureau and filed for future reference, and an account of this work is reported in the Bureau's annual report.

Clerical work of the Bureau.

All business, correspondence, telegrams, reports, etc., are first received by the chief of the Bureau and acted on and disposed of by him after consultation with the Commissioner. The reports from inspectors are opened and replied to by the chief, the reply being dictated by him to the clerk of the Bureau, who prepares, takes a copy of, and mails said reply. The report is then sent to the desk of the entry clerk, who makes an abstract of its contents in the proper books for the subject-matter contained in the report, and it is then indexed and filed for future reference.

The extensive correspondence relating to sick animals, of all kinds and degrees throughout the States and Territories of the United States, giving their symptoms and asking the nature of the disease or diseases from which said animals are suffering, and the means or remedy for curing the same, are all replied to by the chief of the Bureau, his answers being dictated to the clerk, who copies and mails the same. After being answered, such correspondence is indexed and filed. The accounts and vouchers for expenditures are all examined and certified to by the chief of the Bureau before they are passed by the disbursing officer.

One clerk takes charge of and prepares for publication all the matter selected to form a part of the annual report of the Bureau as it appears in the Department Report and the special report of this Bureau, has it prepared by type-writer, corrects and compares the work of the type-writer, forwards to printer, and revises and corrects the printer's proof-sheets.

The following table shows the average number of persons employed in the Bureau by months from its establishment to March 1, 1887.

Average number of employes.

Months.	1884.	1885.	1886.	1887.
January	20	13	55	
February	18	12	42	
March	19	12		
April	21	15		
May	21	15		
June	3	20	15	
July	14	21	17	
August	20	19	16	
September	20	19	28	
October	21	18	57	
November	19	17	58	
December	11	18	47	

The number of days devoted to the consideration of business is shown in the annexed table:

Number of days devoted to the consideration of business.

	*1884.	1885.	1886.	†1887.
Average	175	219	205	58
Maximum	184	362	358	59
Minimum	156	29	10	49

* From July 1.

† Up to March 1.

The above record is for the regular employes only, all being engaged at Washington; the number of these was three in 1884, seven in 1885, twelve in 1886, and nine in 1887. The smallness of the average number of days devoted to business during 1885 and 1886, and also of the minimum number, is accounted for by the fact that some of the employes were on the roll for a short period of time only. None of the work of the employes of this Bureau has been done by proxy.

The following table is added to show the number of days lost by the persons who have been employed by the Bureau at Washington.

Time lost by employes.

Years.	Total employes.	Total days employed.	Total days lost.	Average number of days lost.
1884.....	3	552	28	9 $\frac{1}{3}$
1885.....	7	1,569	71 $\frac{1}{2}$	10 $\frac{1}{2}$
1886.....	12	2,599	147	12 $\frac{1}{2}$
1887 (to March 1).....	9	472	16	1 $\frac{1}{3}$

From the foregoing statement of the work of this Bureau and the methods by which it is performed, it will be seen that its character is such as to make it extremely difficult to answer in a satisfactory manner the other questions of your communication. No detailed account has been kept of the amount of work accomplished by each employé, and the character of the work done by the different employes varies to such a degree that it would be impossible, even were such an account at hand, to determine which employé had accomplished the most and which the least. This detailed record of the work of each employé has not been kept, because, first, the force of the Bureau has scarcely been sufficient to transact the other necessary business which demanded its attention; and, secondly, the work being all under the immediate supervision of the chief, it was not considered that the results obtained from such a record would be worth to the Government what they would cost.

I append the contents of the published reports of the Bureau and a collection of the printed blanks used in the transaction of its business, which will doubtless serve to give a clearer idea of the character of the work and of what has been so far accomplished. The two published reports also accompany this reply.

[*Note by committee.*—The two published reports, being already in print and accessible, are not printed herein.]

Contents of the First Annual Report of the Bureau of Animal Industry, 1884.

The transactions of the Bureau of Animal Industry for the year 1884 are given in detail in the First Annual Report of this Bureau. This volume contains 512 pages, and the writing of the report of the chief of the Bureau, and of the copying and preparation of all the matter contained therein for the printer, the reading of the proof, etc., was performed by the head of the Bureau with the assistance of two clerks and a copyist. This force also performed all the routine work of the Bureau.

Briefly, the amount of work performed by the Bureau, and the results of the investigations on the part of its agents and inspectors, may be summarized as follows:

An investigation as to the extent of the prevalence of pleuro-pneumonia among cattle in the District of Columbia. This required the examination of 423 herds, comprising 2,496 animals, of which 31 were found affected with contagious pleuro-pneumonia. Of the herds examined but 26 were found infected.

An investigation of an outbreak of the same disease in a herd of cattle belonging to Messrs. H. E. Williams and Captain Seaman, of Salem, Conn.

An investigation of a more extensive outbreak of pleuro-pneumonia in Chester County, Pa., in which a number of herds were more or less involved. In this outbreak 296 animals were exposed, and 143 were found affected and killed.

The veterinary inspectors in New Jersey inspected 442 herds, composed of 5,719 animals, of which they found 131 animals affected with pleuro-pneumonia. The number of herds infected in this State was 72.

A limited inspection of stables and herds in and around Baltimore, Md., which revealed the existence of pleuro-pneumonia among cattle in that city and vicinity.

An investigation of a very serious outbreak of pleuro-pneumonia in the vicinity of Geneva and Peoria and other points of Illinois. This investigation resulted in the discovery that the disease had been carried to Illinois in the body of animals purchased at Troy, Ohio. From Illinois the disease was carried to a herd at Cynthiana, Ky., where it proved very destructive. These outbreaks were eventually suppressed by the slaughter of all diseased and many of the exposed animals.

In New York City the inspectors of the Bureau examined 1,466 stables and herds, in which they found 3,931 animals. Of these 53 were found affected with pleuro-pneumonia, and were distributed among 20 herds. On Long Island 1,367 herds were examined, composed of 9,770 animals. Of these 327 were found affected and were distributed among 119 herds. On Staten Island 455 herds, aggregating 3,875 animals,

were examined, only 13 of which were found suffering with pleuro-pneumonia. But 12 herds were found infected on this island. A large number of reinspections were made in Brooklyn and in New Jersey.

Many experiments as to the contagiousness of pleuro-pneumonia were made at the experimental station near this city, and on Barren Island, New York, which are given in detail in this report.

An extensive outbreak of alleged foot-and-mouth disease among cattle in Coffey County, Kans., but which, upon a thorough investigation on the part of the Chief of the Bureau, was found to be ergotism, caused by large quantities of ergot contained in the hay on which the animals had been wintered.

An investigation as to the geographical distribution of Southern cattle fever. This investigation resulted in quite accurately locating the infected line in and through the States of Virginia, North and South Carolina, Georgia and Tennessee. Maps of these States, indicating the infecting line, accompany the report on this subject.

A continuation of a careful and thorough investigation as to the nature and cause of swine plague concludes the report proper of the Chief of the Bureau.

Following the report of the Chief of the Bureau will be found those of the agents and inspectors, extracts from letters of correspondents, and contributions of interest from various sources.

First. Is that of Agent Grinnell on the "Cattle interests west of the Mississippi River." This report gives the acreage, the number of animals grazed, the number of acres required for grazing an individual animal in the States and Territories named, and the total value of all cattle west of the Mississippi. Much additional information relating to the range cattle industry is contained in this report.

Second. A report on the subject of the "Live stock and meat traffic of Chicago," by Edward W. Perry. This is a very thorough and comprehensive paper, and gives a greater amount of statistical information concerning the vast traffic in live stock and meats in Chicago than had previously been furnished from any source.

Third. Report of Agent Fullinwider on the "Cattle interests of the West." While this paper may be regarded as supplemental to the report of Agent Grinnell, it contains information that will not be found in that report.

Fourth. "The gape disease of fowls and the parasite by which it is caused," a translation by Dr. Theobald Smith of a memoir on a verminous epizootic disease of the pheasants, and on the parasite which causes it, by M. P. Megin, laureate of the institute (Académie des Sciences) member of the Société de Biologie, honorary associate of the Royal Veterinary College of London, etc.

Fifth. "Contagious pleuro-pneumonia in New Jersey," by Ezra M. Hunt, M. D., Sc. D. This paper contains a history of the introduction and progress of this disease among the cattle of New Jersey.

Sixth. "Ergotism among Cattle in Kansas." Report of Dr. M. R. Trumbower on the outbreak of ergotism among Kansas cattle, alluded to on a preceding page.

Seventh. A detailed report, by Dr. James Law, of the International Veterinary Congress, held at Brussels on September 10, 1883.

Eighth. Proceedings of the Hamburg International Exhibition, as reported by Mr. J. H. Sanders, of Illinois, and Dr. Rush Shippen Huidekoper, of Pennsylvania.

The remaining portion of this volume contains an account of an outbreak of Southern cattle fever among Kansas cattle, by Dr. M. R. Trumbower, veterinary inspector; investigation as to the cause of Southern cattle fever, by Dr. H. J. Detmers; "Contagious animal diseases," by Dr. Ezra M. Hunt, of New Jersey; report of Dr. Trumbower on an outbreak of Southern cattle fever among cattle at the Chicago Union Stock Yards; report of Veterinary Inspector W. H. Rose on the prevalence of hog cholera in the States of Maryland and Virginia; the particulars of an outbreak of pleuro-pneumonia among cattle in Delaware; the rules and regulations of the Dominion of Canada relative to the importation of cattle; report on the prevalence of glanders among horses in Miami County, Mo.; prevalence of Southern fever among cattle in Virginia and Ohio; parasitic bronchitis among calves near Alpha, Mo.; history of lung plague in Richmond County, N. Y., by Veterinary Inspector William Rose; reports of the superintendents of the various cattle quarantine stations; a paper on trichiniasis, by Dr. D. E. Salmon, Chief of the Bureau of Animal Industry; extracts from letters of correspondents.

This concludes the First Annual Report of the Bureau of Animal Industry for the year 1884.

Contents of the Second Annual Report of the Bureau of Animal Industry, 1885.

The Second Annual Report of this Bureau is comprised in a volume of 662 pages. No increase of clerks or copyists was made during the year, but all the work of writing and preparing the matter for the printer, the reading of proof, and the routine

work of the Bureau was performed by the same force as that employed during the preceding year. The following is the table of contents of this volume:

- Report of Dr. D. E. Salmon, Chief of the Bureau of Animal Industry: On contagious pleuro-pneumonia; swine plague; Southern cattle fever; gapes in fowls; verminous bronchitis (lung worms); neat-cattle quarantine.
- Report of H. M. Taylor, agent Bureau of Animal Industry: On importance of the range industry.
- Report of S. H. Standart, agent Bureau of Animal Industry: On condition of the live-stock industry of Colorado and the Territories of the Northwest.
- Report of E. W. Perry, inspector Bureau of Animal Industry: On the cattle trade and dairy interests of Alabama, Georgia, Illinois, Indiana, and Ohio.
- Report of J. N. Bradley, inspector Bureau of Animal Industry: On the swine and fowl industry of Missouri, and the annual loss by disease; on the cattle interests west of the Mississippi.
- Report of Lawrence Wilson, inspector Bureau of Animal Industry: On the condition of the live-stock industry west of the Mississippi.
- Report on the prevalence and losses by swine plague in Nebraska.
- Report of Dr. Ezra M. Hunt on the extension of contagious animal diseases and methods for their limitation.
- Miscellaneous: Neat-cattle quarantine regulations; extracts of interest from letters of correspondents of the Bureau; certified copies of the laws of the States and Territories for the control of contagious animal diseases, and the proclamations issued thereunder; investigation of contagious pleuro-pneumonia (details of inspections).

The first section of the report of the Chief of the Bureau treats of the outbreak of pleuro-pneumonia in the herd near Cynthiana, Ky., and of a more recent outbreak of the same malady among cattle belonging to the State Lunatic Asylum of Missouri, located at Fulton, in that State. The action taken by the Department and the means adopted by the Bureau, which resulted in the speedy suppression of the disease at these points, are given in detail by the Chief of the Bureau.

Investigations as to the prevalence of pleuro-pneumonia or lung plague of cattle were continued throughout the year. A summary of the inspections made this year is given as follows:

Summary of inspections in 1885.

Location.	Number of herds and stables examined.	Number of cattle examined.	Number of animals affected with contagious pleuro-pneumonia.	Number of herds infected.
New York City.....	870	6,946	95	45
Slaughter-houses, etc.....	986	4,593	395	.....
Piers, steamers, etc.....	203	2,806	.....	.....
New Jersey.....	3,896	43,365	210	58
Reinspections.....	52	755	73	16
Abattoirs, stock-yards.....	45	.....	4	.....
Delaware.....	24	646	75	11
Maryland.....	19	378	38	11
District of Columbia.....	342	2,504	100	55
Virginia and West Virginia.....	43	1,039	17	11
Kentucky.....	134	1,615	104	29
Total.....	6,614	64,650	1,111	236

A large section of the report is devoted to a presentation of measures for the extermination of pleuro-pneumonia. Under this head it is shown that no specific has been discovered for the treatment of this disease, and that inoculation, as a preventive measure, has been a failure both in Europe and in this country. The great difficulties that will be encountered in attempting to quarantine against the spread of the contagion at State lines is shown, and the authority of the Government to pass a law for the control and extirpation of the malady under the clause for the regulation of commerce between the States is argued at considerable length.

The results of the experiments instituted for the purpose of determining the nature and cause of swine plague, carried forward during the year at the experimental station and in the laboratory of the Bureau, are given in detail by the chief of the Bureau.

The agents of the Bureau continued the investigation of Southern cattle fever, and completed the work of locating the infected line through Arkansas, the Indian Terri-

tory, and Texas. These agents were greatly aided in their work by the cattle raisers of Texas and others interested in the cattle industry of the country, as will be seen by the contributions submitted by them.

The investigations as to the cause of gapes in fowls, commenced in the preceding year, was continued and brought to a close.

The report proper of the chief of the Bureau is brought to a close, with a submission of the reports of the superintendents of the various neat-cattle quarantine stations.

The remaining portion of this volume is devoted to the detailed reports of the agents and inspectors of the Bureau, giving the character of the investigations and the amount of work accomplished during the year. The appendix contains a record of the inspections made by the inspectors of the Bureau in the investigation of pleuro-pneumonia.

The report of agent H. M. Taylor on the "Importance of the Range Industry," gives information of much value relating to this important industry that had not before been made accessible to the general public. His familiarity with the cattle interests of the plains renders his paper of peculiar interest and great value.

The second report of Agent S. H. Standart is devoted to a presentation of matters and facts relating to the live-stock industry of Colorado and the Territories of the Northwest.

Inspector Edward W. Perry continued his investigations of the cattle trade and dairy interests during the year. His report, as presented in this volume, contains valuable statistics relating to this industry and its allied interests in the States of Alabama, Georgia, Illinois, Indiana, and Ohio.

Inspector J. N. Bradley made an investigation as to the extent to which swine plague and fowl cholera prevailed in Missouri, and the value of the losses occasioned by these diseases during the year. Inspector Bradley also makes a report on the subject of cattle interests west of the Mississippi. This is followed by a report of Inspector Lawrence Wilson on the same subject.

On the earnest solicitation of citizens of Nebraska, a special investigation as to the nature, cause, extent to which it prevailed, and the losses occasioned during the year, by a disease supposed to be hog cholera or swine plague, was instituted, the results of which are given at length in this volume.

"The Extension of Contagious Animal Diseases and Methods for their Limitation" is a paper contributed by Ezra M. Hunt, M. D., Sc. D., and relates to the history of pleuro-pneumonia in the State of New Jersey and the action taken for its limitation and suppression.

Following the extracts from letters of correspondents of the Bureau is a compilation of the laws of all the States and Territories having enactments for the control and suppression of contagious animal diseases, and the proclamations issued by the authority of such laws.

Work of the Bureau of Animal Industry during the year 1886.

Notwithstanding the routine work of the Bureau was greatly increased during the year 1886, no additional clerical force was employed. The routine work of the Bureau consists of the immediate consideration and answering of all inquiries of correspondents either by telegram or letter, the keeping of a permanent record of every inspection made in the investigation of contagious pleuro-pneumonia, the duplicating of these inspections, and the copying of the reports of the agents and inspectors of the Bureau, the issuing of permits for the importation and quarantining of neat cattle, the keeping of a record of the arrivals and release of the same, and the preparation of all matter intended for publication in the Annual Report of the Department, in special reports, and in the Annual Report of the Bureau of Animal Industry, and the reading of the proof of these reports.

The Annual Report of the Bureau of Animal Industry for 1886 has not yet been published. It will, when issued, contain between four and five hundred pages. The following is the table of contents:

- Report of Dr. D. E. Salmon, chief of the Bureau of Animal Industry: On the progress of pleuro-pneumonia and action taken in regard to it; on investigation of swine diseases, *i. e.*, hog cholera and swine plague; on United States neat-cattle quarantine.
- Report of H. M. Taylor, agent Bureau of Animal Industry: On the condition of the cattle-range industry.
- Report of E. W. Perry: On the cattle trade and allied industries of the States of Michigan, Wisconsin, and Tennessee; on the dressed-meat traffic.
- Report of George W. Rust: On calf-raising on the plains.
- Report of A. S. Mercer: On the cattle industry of California.
- Report of W. H. Harbaugh, V. S.: On the disease known as "staggers" among horses in Virginia and North Carolina.
- Report of M. Stalker: On the "loco" plant and its effect on horses.

Extracts from letters of correspondents: Recent enactments and proclamations of the various States and Territories for the control of contagious animal diseases; details of inspections in investigation of contagious pleuro-pneumonia.

The report of the chief of the Bureau on the subject of pleuro-pneumonia gives the final action of the Department in regard to the outbreak in Kentucky, and the completion of the work of extirpation of the malady among the cattle of that State. An account of the discovery of this contagion among cattle in distillery sheds and other stables in Chicago, Ill., and a full report as to the action of the Department in measures for its suppression, is also given.

The act making appropriations for the Department for the fiscal year ending June 30, 1888, approved March 3, 1887, greatly increased the appropriation and enlarged the duties of the chief of the Bureau, and hence has greatly increased the routine work of the Bureau and that of its agents, inspectors, and other employés.

Rules and regulations of the United States Department of Agriculture, for the suppression and extirpation of contagious, infectious, and communicable diseases among the domestic animals of the United States.

[Prepared by the Commissioner of Agriculture.]

In pursuance of an act of Congress entitled "An act for the establishment of a Bureau of Animal Industry, to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuro-pneumonia and other contagious diseases among domestic animals," approved the 29th day of May, 1884, and of section 3 of said act, the following rules and regulations are hereby prepared and adopted for the speedy and effectual suppression and extirpation of contagious, infectious, and communicable diseases among the domestic animals of the United States:

RULES AND REGULATIONS.

1. Whenever it shall come to the knowledge of the Chief of the Bureau of Animal Industry of the Department of Agriculture that there exists, or there is good cause to believe there exists, any contagious, infectious, or communicable disease among domestic animals in any part of the United States, and he believes there is danger of such disease spreading to other States or Territories, he shall at once direct an inspector to make an investigation as to the existence of said disease.

2. Said inspector shall at once proceed to the locality where said disease is believed to exist and make an examination of the animals said to be affected with disease, and report the result of such examination to the Chief of the Bureau of Animal Industry.

3. Should the inspector on such investigation find that a contagious, infectious, or communicable disease exists among the animals examined, and especially pleuro-pneumonia, he shall direct the temporary quarantine of said animals, and the herds among which they are, and adopt such sanitary measures as may be necessary to prevent the spread of the disease, and report his action to the Chief of the Bureau. He will further notify in writing the owner or owners, or person or persons in charge of such animal or animals, of the existence of the contagious disease, and that said animal or animals have been placed in quarantine, and warn him or them from moving said animal or animals under penalty of sections 6 and 7 of the act of Congress approved May 29, 1884.

4. When the Chief of the Bureau of Animal Industry is satisfied of the existence of any contagious disease among domestic animals in any locality of the United States, and especially of pleuro-pneumonia, and that there is danger of said disease spreading to other States or Territories, he will report the same to the Commissioner of Agriculture, who will quarantine said locality in the mode and manner as provided in Rule 12. He shall cause a thorough examination of all animals of the kind diseased in said locality, and all such animals found diseased he will cause to be slaughtered. He shall establish a quarantine for a period of not less than ninety days of all animals that have come in contact with diseased animals, or have been on premises or in buildings on or in which diseased animals have been, or have been in any way exposed to disease; and shall make and enforce all such sanitary regulations as the exigencies of the case may require. He will cause to be disinfected in such manner as he deems best all sheds, corrals, yards, barns, and buildings in which diseased animals have been, and until such premises and buildings have been so disinfected and declared free from contagion by certificate in writing signed by an inspector of the Bureau of Animal Industry, no animal or animals shall be permitted to go upon or into said premises and buildings. Should, however, any animal or animals be put upon said premises or into said buildings in violation of this rule and regulation, then such animal or animals shall be placed in quarantine for a period of not less

than ninety days, and said premises or buildings be again disinfected. Said second disinfection and the quarantine of said animals to be at the expense of the owner of said premises or buildings.

5. All animals quarantined by order of the Chief of the Bureau of Animal Industry shall have a chain fastened with a numbered lock placed around their horns, or in case of hornless animals placed around their necks; and a record will be kept showing the number of lock placed upon each animal, name and character of animal, and marks of identification, name of owner, locality, and date of quarantine. The Chief of the Bureau, however, may, in his discretion, in place of chaining said animals, cause the animals to be branded in such manner as he may designate, or may place a guard over the same.

6. All animals quarantined will be deemed and considered as "affected with contagious disease," and any person or persons moving said quarantined animals from the infected district will be prosecuted under sections 6 and 7 of the act of Congress establishing the Bureau of Animal Industry approved May 29, 1884.

7. Whenever in the judgment of the Chief of the Bureau of Animal Industry it becomes necessary to kill animals that have been exposed to the contagious disease known as pleuro-pneumonia, in order to prevent the spread of said disease from one State or Territory to another, he shall cause the same to be slaughtered.

8. All animals diseased with pleuro-pneumonia, and all animals exposed to pleuro-pneumonia, that have been condemned to be slaughtered, shall be first appraised as to their value at the time of their condemnation. Said appraisement shall be made in the mode and manner provided for by the law of the State in which they are located, and such compensation on their appraised value will be paid as is provided for by the law of such State. In case such State has no law for the appraisement of the value of animals diseased with pleuro-pneumonia, or that have been exposed to pleuro-pneumonia, or either, then the Chief of the Bureau of Animal Industry shall direct an inspector of the Bureau to convene a board of appraisers to consist of three members, one of whom said inspector shall appoint, one to be appointed by the owner of the animal or animals condemned, and these two will appoint the third: in case the said owner shall neglect or refuse to name an appraiser, then by two appraisers to be appointed by said inspector. This board will appraise the value of the animals condemned and certify to the same in writing under oath, and the amount so fixed by said board shall be paid to the owner of the animals condemned. Should the owner of the animals condemned be dissatisfied with the appraisement, he may appeal from said appraisement to the Circuit Court of the United States, and the amount found by said court to be the value of the condemned animals will be paid to the owner.

9. Whenever it is deemed necessary by the Chief of the Bureau of Animal Industry to supervise and inspect any of the lines of transportation operating in the United States, that do business in and through more than one State, or connect with lines doing business in and through other States, and the boats, cars, and stock-yards in connection with the same, he shall designate suitable inspectors for that purpose, and make all necessary regulations for the quarantine and disinfection of all stock-yards, cars, boats, and other vehicles of transportation in which have been, or in which have been transported animals affected with a contagious disease or suspected to have been affected with such a disease. Such cars and other vehicles of transportation declared in quarantine shall not be again used to transport, store, or shelter animals or merchandise until certified to be free of contagion by a certificate signed by the inspector supervising their disinfection, and such stock-yards shall not again have animals placed in them until likewise declared free of contagion.

10. All quarantined stock, premises, and buildings will be under the charge and supervision of an inspector of the Bureau of Animal Industry, and shall be in no case free from quarantine until so ordered by the Chief of the Bureau.

11. Whenever any inspector of the Bureau of Animal Industry is prevented, or obstructed, or interfered with in the discharge of his duty in the examining of animals suspected to have a contagious disease, or in placing under quarantine animals or premises, or in disinfecting them, he will report the same to the Chief of the Bureau. He will also call upon the sheriff or other police authorities of the locality where said obstruction or interference occurs, for aid and protection in the performing of his duty. Should such sheriff or police authorities neglect or refuse to render such aid and protection he will then apply to the United States marshal of said district for the necessary force and assistance needed to protect him in the carrying out of the duties imposed upon him by these rules and regulations, and the provisions of the law by authority of which they are made. He will also file with the United States district attorney information of all the facts connected with such obstruction and interference, and the names of the party or parties causing the same.

12. Should from any cause the Chief of the Bureau of Animal Industry find that it is impossible to enforce these rules and regulations in any State, and that in consequence thereof there is great danger that pleuro-pneumonia will spread from said State to other States and Territories, he will report the same to the Commissioner of

Agriculture. Thereupon the Commissioner of Agriculture, if he believes the exigency of the case requires it, will declare said State, in which pleuro-pneumonia exists and in which it is impossible to carry out these rules and regulations, to be quarantined against the exportation of animals of the kind diseased to any other State, Territory, or foreign country. Said order of the Commissioner declaring the quarantine of a State will be published in at least two papers in said State, once a week during the existence of said quarantine, and in such other papers as he may select. Notification of the order declaring said quarantine will be certified to the governor of the State quarantined, as well as to the governors of all other States and Territories, and to the agents of all transportation companies doing business in or through said State. All animals of the kind quarantined against in said State will be deemed as animals "affected with contagious disease," and any person moving or transporting any of said animals to any other State or Territory, or delivering any of such animals to any transportation company to be so transported, will be prosecuted under sections 6 and 7 of the act of Congress approved May 29, 1884. Provided, however, that any animal of the kind quarantined against that has been examined by an inspector of the Bureau of Animal Industry, and by a certificate in writing signed by such inspector declared to be free from pleuro-pneumonia, may be exported to any other State or Territory, and provided further that said animal shall be exported within forty-eight hours after such examination and signing of said certificate, so that said animal may not be exposed to disease before leaving said State.

13. Before giving the certificate provided for by Rule 12 the inspector must be furnished with an affidavit made by two reputable and disinterested persons, stating that they have known the animals to be examined for a period of six months immediately prior to the date of examination, and that during that time the animals have not been exposed to pleuro-pneumonia, that they have not been in any of the buildings or on any of the premises, or among any of the herds known to be affected with pleuro-pneumonia, or suspected to be so affected. The inspector may also require further proof as to whether said animals to be examined have been exposed to pleuro-pneumonia.

14. All rules and regulations heretofore made are hereby revoked, and these rules and regulations will be in full force and effect on and after the 15th day of April, 1887.

NORMAN J. COLMAN,
Commissioner of Agriculture.

[PUBLIC—No. 41.]

AN ACT for the establishment of a Bureau of Animal Industry, to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuro-pneumonia and other contagious diseases among domestic animals.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Commissioner of Agriculture shall organize in his Department a Bureau of Animal Industry, and shall appoint a chief thereof, who shall be a competent veterinary surgeon, and whose duty it shall be to investigate and report upon the condition of domestic animals of the United States, their protection and use, and also inquire into and report the causes of contagious, infectious, and communicable diseases among them, and the means for the prevention and cure of the same, and to collect such information on these subjects as shall be valuable to the agricultural and commercial interests of the country; and the Commissioner of Agriculture is hereby authorized to employ a force sufficient for this purpose, not to exceed twenty persons at any one time. The salary of the chief of said Bureau shall be three thousand dollars per annum; and the Commissioner shall appoint a clerk for said Bureau, with a salary of one thousand five hundred dollars per annum.

SEC. 2. That the Commissioner of Agriculture is authorized to appoint two competent agents, who shall be practical stock raisers, or experienced business men familiar with questions pertaining to commercial transactions in live stock, and whose duty it shall be, under the instructions of the Commissioner of Agriculture, to examine and report upon the best methods of treating, transporting, and caring for animals, and the means to be adopted for the suppression and extirpation of contagious pleuro-pneumonia, and to provide against the spread of other dangerous, contagious, infectious, and communicable diseases. The compensation of said agents shall be at the rate of ten dollars per diem with all necessary expenses while engaged in the actual performance of their duties under this act, when absent from their usual place of business or residence as such agent.

SEC. 3. That it shall be the duty of the Commissioner of Agriculture to prepare such rules and regulations as he may deem necessary for the speedy and effectual suppression and extirpation of said diseases, and to certify such rules and regulations to the

executive authority of each State and Territory, and invite said authorities to co-operate in the execution and enforcement of this act. Whenever the plans and methods of the Commissioner of Agriculture shall be accepted by any State or Territory in which pleuro-pneumonia or other contagious, infectious, or communicable disease is declared to exist, or such State or Territory shall have adopted plans and methods for the suppression and extirpation of said diseases, and such plans and methods shall be accepted by the Commissioner of Agriculture, and whenever the governor of a State or other properly constituted authorities signify their readiness to co-operate for the extinction of any contagious, infectious, or communicable disease in conformity with the provisions of this act, the Commissioner of Agriculture is hereby authorized to expend so much of the money appropriated by this act as may be necessary in such investigations, and in such disinfection and quarantine measures as may be necessary to prevent the spread of the disease from one State or Territory into another.

SEC. 4. That in order to promote the exportation of live stock from the United States the Commissioner of Agriculture shall make special investigation as to the existence of pleuro-pneumonia, or any contagious, infectious, or communicable disease, along the dividing lines between the United States and foreign countries, and along the lines of transportation from all parts of the United States to ports from which live stock are exported, and make report of the results of such investigation to the Secretary of the Treasury, who shall, from time to time, establish such regulations concerning the exportation and transportation of live stock as the results of said investigations may require.

SEC. 5. That to prevent the exportation from any port of the United States to any port in a foreign country of live stock affected with any contagious, infectious, or communicable disease, and especially pleuro-pneumonia, the Secretary of the Treasury be, and he is hereby, authorized to take such steps and adopt such measures, not inconsistent with the provisions of this act, as he may deem necessary.

SEC. 6. That no railroad company within the United States, or the owners or masters of any steam or sailing or other vessel or boat, shall receive for transportation or transport, from one State or Territory to another, or from any State into the District of Columbia, or from the District into any State, any live stock affected with any contagious, infectious, or communicable disease, and especially the disease known as pleuro-pneumonia; nor shall any person, company, or corporation deliver for such transportation to any railroad company, or master or owner of any boat or vessel, any live stock, knowing them to be affected with any contagious, infectious, or communicable disease; nor shall any person, company, or corporation drive on foot or transport in private conveyance from one State or Territory to another, or from any State into the District of Columbia, or from the District into any State, any live stock, knowing them to be affected with any contagious, infectious, or communicable disease, and especially the disease known as pleuro-pneumonia: *Provided*, That the so-called splenic or Texas fever shall not be considered a contagious, infectious, or communicable disease within the meaning of sections four, five, six, and seven of this act, as to cattle being transported by rail to market for slaughter, when the same are unloaded only to be fed and watered in lots on the way thereto.

SEC. 7. That it shall be the duty of the Commissioner of Agriculture to notify, in writing, the proper officials or agents of any railroad, steamboat, or other transportation company doing business in or through any infected locality, and by publication in such newspapers as he may select, of the existence of said contagion; and any person or persons operating any such railroad, or master or owners of any boat or vessel, or owner or custodian of or person having control over such cattle or other live stock within such infected district, who shall knowingly violate the provisions of section six of this act, shall be guilty of a misdemeanor, and, upon conviction, shall be punished by a fine of not less than one hundred dollars nor more than five thousand dollars, or by imprisonment for not more than one year, or by both such fine and imprisonment.

SEC. 8. That whenever any contagious, infectious, or communicable disease affecting domestic animals, and especially the disease known as pleuro-pneumonia, shall be brought into or shall break out in the District of Columbia, it shall be the duty of the Commissioners of said District to take measures to suppress the same promptly and to prevent the same from spreading; and for this purpose the said Commissioners are hereby empowered to order and require that any premises, farm, or farms where such disease exists, or has existed, be put in quarantine; to order all or any animals coming into the District to be detained at any place or places for the purpose of inspection and examination; to prescribe regulations for and require the destruction of animals affected with contagious, infectious, and communicable disease, and for the proper disposition of their hides and carcasses; to prescribe regulations for disinfection, and such other regulations as they may deem necessary to prevent infection or contagion being communicated, and shall report to the Commissioner of Agriculture whatever they may do in pursuance of the provisions of this section.

SEC. 9. That it shall be the duty of the several United States district attorneys to prosecute all violations of this act which shall be brought to their notice or knowledge by any person making the complaint under oath; and the same shall be heard before any district or circuit court of the United States or Territorial court holden within the district in which the violation of this act has been committed.

SEC. 10. That the sum of one hundred and fifty thousand dollars, to be immediately available, or so much thereof as may be necessary, is hereby appropriated, out of any moneys in the Treasury not otherwise appropriated, to carry into effect the provisions of this act.

SEC. 11. That the Commissioner of Agriculture shall report annually to Congress, at the commencement of each session, a list of the names of all persons employed, an itemized statement of all expenditures under this act, and full particulars of means adopted and carried into effect for the suppression of contagious, infectious, or communicable diseases among domestic animals.

Approved May 29, 1884.

SALARIES AND EXPENSES BUREAU OF ANIMAL INDUSTRY.

For carrying out the provisions of the act of May twenty-ninth, eighteen hundred and eighty-four, establishing the Bureau of Animal Industry, five hundred thousand dollars; and the Commissioner of Agriculture is hereby authorized to use any part of this sum he may deem necessary or expedient, and in such manner as he may think best, to prevent the spread of pleuro-pneumonia, and for this purpose to employ as many persons as he may deem necessary, and to expend any part of this sum in the purchase and destruction of diseased or exposed animals, and the quarantine of the same whenever in his judgment it is essential to prevent the spread of pleuro-pneumonia from one State into another; one hundred thousand dollars of this sum, or so much thereof as may be necessary, to be immediately available.

Appropriation act for Department of Agriculture, approved March 3, 1887.

U. S. Department of Agriculture.—Investigation of splenic or Texas fever of cattle.

Name: _____.
 Post-office: _____.
 County: _____.
 State: _____.
 Locality: _____ miles _____.
 No. native cattle in herd: _____.
 No. purchased cattle: _____.
 Total No. of cattle: _____.
 Date of outbreak: _____, 188—.
 Cause of outbreak: _____.
 If purchased, where and when? _____.
 If poisoned pasture, how and when infected? _____.
 Name of disease: _____.
 Symptoms and average length of disease: _____.
 No. of native cattle that have died: _____.
 No. of purchased cattle that have died: _____.
 Total No. that have died: _____.
 Value of cattle that have died: _____.

REMARK.

U. S. Department of Agriculture.—Rules and regulations for co-operation between the U. S. Department of Agriculture and the authorities of the several States and Territories for the suppression and extirpation of contagious pleuro-pneumonia of cattle.

Recent acts of Congress make it the duty of the Commissioner of Agriculture to prepare rules and regulations for the suppression and extirpation of the contagious pleuro-pneumonia of cattle, and authorize expenditures for investigation, disinfection, quarantine, and for the purchase of diseased animals for slaughter. The following are the sections bearing upon this subject:

SEC. 3. That it shall be the duty of the Commissioner of Agriculture to prepare such rules and regulations as he may deem necessary for the speedy and effectual suppression and extirpation of said diseases, and to certify such rules and regulations to the executive authority of each State and Territory, and invite said authorities to co-operate in the execution and enforcement of this act. Whenever the plans and

methods of the Commissioner of Agriculture shall be accepted by any State or Territory in which pleuro-pneumonia or other contagious, infectious, or communicable disease is declared to exist, or such State or Territory shall have adopted plans and methods for the suppression and extirpation of said diseases, and such plans and methods shall be accepted by the Commissioner of Agriculture, and whenever the governor of a State or other properly constituted authorities signify their readiness to co-operate for the extinction of any contagious, infectious, or communicable disease in conformity with the provisions of this act, the Commissioner of Agriculture is hereby authorized to expend so much of the money appropriated by this act as may be necessary in such investigations, and in such disinfection and quarantine measures as may be necessary to prevent the spread of the disease from one State or Territory into another. (Approved May 29, 1884.)

BUREAU OF ANIMAL INDUSTRY.

For carrying out the provisions of the act of May 29, 1884, establishing the Bureau of Animal Industry, \$100,000; and the Commissioner of Agriculture is hereby authorized to use any part of this sum he may deem necessary or expedient, and in such manner as he may think best, to prevent the spread of pleuro-pneumonia, and for this purpose to employ as many persons as he may deem necessary, and to expend any part of this sum in the purchase and destruction of diseased animals whenever in his judgment it is essential to prevent the spread of pleuro-pneumonia from one State into another. (Approved June 30, 1886.)

In accordance with these laws I hereby certify the following rules and regulations for co-operation between the Department of Agriculture and the authorities of the several States and Territories, which I deem necessary to insure results commensurate with the money expended:

INSPECTION.

1. The necessary inspectors will be furnished by the Bureau of Animal Industry of the Department of Agriculture.

2. The properly constituted inspectors of the Bureau of Animal Industry which are assigned to the respective States are to be authorized by proper State authorities to make inspections of cattle under the laws of the State; they are to receive such protection and assistance as would be given to State officers engaged in similar work, and shall be permitted to examine quarantined herds whenever so directed by the Commissioner of Agriculture or the Chief of the Bureau of Animal Industry.

3. All reports of inspections will be made to the Bureau of Animal Industry, and a copy of these will then be made and forwarded to the proper State authorities; when, however, any inspector discovers a herd infected with contagious pleuro-pneumonia he will at once report the same to the proper State authority as well as to the Bureau of Animal Industry.

4. The inspectors, while always subject to orders from the Department of Agriculture, will cordially co-operate with State authorities and will follow instructions received from them.

QUARANTINE.

5. When contagious pleuro-pneumonia is discovered in any herd, the owner or person in charge is to be at once notified by the inspector, and the quarantine regulations of the State in which the herd is located are to be enforced from that time. The affected animals will be isolated, when possible, from the remainder of the herd until they can be properly appraised and slaughtered.

6. To insure a perfect and satisfactory quarantine, a chain fastened with a numbered lock will be placed around the horns, or with hornless animals around the neck, and a record will be kept showing the number of the lock placed upon each animal in the herd.

7. The locks and chains will be furnished by the Department of Agriculture, but they will become the property of the State in which they are used, in order that any one tampering with them can be proceeded against legally for injuring or embezzling the property of the State.

8. Quarantine restrictions once imposed are not to be removed by the State authorities without the consent of the proper officers of the Department of Agriculture.

9. The period of quarantine will be at least ninety days, dating from the removal of the last diseased animal from the herd. During this period no animal will be allowed to enter the herd or to leave it, and all animals in the herd will be carefully isolated from other cattle.

When possible, all infected herds are to be held in quarantine and not allowed to leave the infected premises except for slaughter. In this case fresh animals may be added to the herd at the owner's risk, but are to be considered as infected animals and subjected to the same quarantine regulations as the other members of the herd.

SLAUGHTER AND COMPENSATION.

10. All animals affected with contagious pleuro-pneumonia are to be slaughtered as soon after their discovery as the necessary arrangements can be made.

11. When diseased animals are reported to the State authorities they shall promptly take such steps as they desire to confirm the diagnosis. The animals found diseased are then to be appraised according to the provisions of the State law, and the proper officer of the Bureau of Animal Industry (who will be designated by the Commissioner of Agriculture) notified of the appraisement. If this representative of the Bureau of Animal Industry confirms the diagnosis and approves the appraisement, the Department of Agriculture will purchase the diseased animals of the owner and pay such a proportion of the appraised value as is provided for compensation in such cases by the laws of the State in which the animals are located, when they are condemned and slaughtered by State authority.

DISINFECTION.

12. All necessary disinfection will be conducted by the employés of the Bureau of Animal Industry.

INOCULATION.

13. Inoculation is not recommended by the Department of Agriculture, and it is believed that its adoption with animals that are to be afterwards sold to go into other herds would counteract the good results which would otherwise follow from the slaughter of the diseased animals. It may, however, be practiced by State authorities under the following rules:

14. No herds but those in which pleuro-pneumonia has appeared are to be inoculated.

15. Inoculated herds are to be quarantined with lock and chain on each animal, the quarantine restrictions are to remain in force as long as any inoculated cattle survive, and these animals are to leave the premises only for immediate slaughter.

16. Fresh animals are to be taken into inoculated herds only at the risk of the owner, and shall be subject to the same rules as the other cattle of the inoculated herd.

17. The chief of the Bureau of Animal Industry is to be promptly notified by the State authorities of each herd inoculated, of the final disposition of each member of the herd, of the *post mortem* appearances, and of any other facts in the history of the herd which may prove of value.

The co-operation of governors, of State live-stock commissioners, and of other officers who may be in charge of the branch of the service provided for the control of the contagious diseases of animals in the States where pleuro-pneumonia exists, is earnestly requested under these rules and regulations, which have been framed with a view of securing uniform and efficient action throughout the whole infected district. It is hoped that, with a vigorous enforcement of such regulations, the disease may be prevented from extending beyond its present limits, and may be in time entirely eradicated.

NORMAN J. COLMAN,
Commissioner of Agriculture.

WASHINGTON, D. C., August 2, 1886.

By virtue of the authority imposed upon me as governor of the State of _____, I hereby accept the above rules and regulations, and the proper officers of this State will co-operate with the U. S. Department of Agriculture for their enforcement.

_____, 1886.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Chicago, Ill., ————, 188—.

Mr. ————, ————:

SIR: I desire, as agent of the Bureau of Animal Industry, and by request of the Commissioner of Agriculture, to obtain information and answers to the following questions:

1. What is your estimate of the number of acres in the ———— adapted to pasturage, and the number of cattle they would sustain?
2. The most acceptable dairy breeds?
3. The breeds best adapted to beef production?
4. The number devoted to dairy purposes?
5. The annual increase of cattle?
6. What are the favorite breeds for beef, and the number of each?
7. What age are cattle turned to market?
8. What is the cost per car to Kansas City, Saint Louis, or Chicago, and the estimated cost per hundred for rearing?
9. The condition of cattle at this season, the modes of shelter, and the gain or loss of the animals during winter, and the percentage of loss for want of shelter?
10. What is your opinion as to the economy and practicability of the shipment of dressed beef?
11. If animals have diseases, what are they, and what are the losses by them?
12. What methods do you suggest for the prevention of diseases?
13. The estimated annual value of cattle slaughtered and sold in ————?
14. Who take the lead in the cattle industry in your section as to numbers and successful management, and on how large a scale?
15. Please furnish me any facts which may be of interest, and opinions as to the future of this great industry?

J. H. SANDERS,
Agent Bureau of Animal Industry, Grinnell, Iowa.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Chicago, Ill., ————, 1887.

Mr. ————, ————:

SIR: The Bureau of Animal Industry of the Department of Agriculture is desirous of obtaining as accurate information as possible as to the number, age, and value of the different breeds of cattle in the United States. The dissemination of knowledge regarding the extent and value of good breeding among cattle greatly benefits breeders, and promotes the welfare of consumers of milk, butter, cheese, and meats. In consideration of these facts it is hoped that you will fill out as far as is within your power the blank on the opposite page and return it to me at your earliest convenience.

Any information relating to the better breeds of cattle will be gladly received. All information relating to prices obtained or paid for registered animals will be treated as confidential, and will be used only for ascertaining the ranges and the general averages of prices received at public and at private sales for such animals.

No postage-stamp will be required to pass your reply through the mail if you use the inclosed envelope.

In the earnest hope that I will receive an early reply,

I remain, very respectfully,

E. W. PERRY
———, 188—.

To E. W. PERRY,
No. 234 La Salle Street, Chicago,
Agent United States Department of Agriculture:

SIR: There are now in my herd the following purely bred cattle:

Breed.	Number.	Ages.	Value.
Aberdeen-Angus.....	\$
Ayrshire.....
Devon.....
Galloway.....
Guernsey.....
Hereford.....
Holstein-Friesian.....
Jersey.....
Norfolk-Suffolk.....
Shorthorn.....
Swiss.....
West Highland.....

Signed : _____.
Post-office : _____.
County : _____.
State : _____.

E. W. Perry, special agent.

UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

CHICAGO, ILL., July, 1886.

Mr. JOHN BROWN,
Lacona, Iowa:

SIR: The dissemination of accurate knowledge regarding the extent and value of good breeding among cattle greatly benefits breeders and promotes the welfare of consumers of milk, butter, cheese, and meats. In consideration of these facts it is hoped that you will answer the subjoined questions as fully, accurately, and promptly as you can.

All information relating to prices obtained or paid for registered animals will be treated as confidential, and will be used only for ascertaining the ranges and the general averages of prices received at public and at private sales for such animals.

Any information not indicated by the queries which follow, but bearing on the subject of the benefits arising from the use of purely-bred animals for breeding purposes, will be thankfully received.

Respectfully,

E. W. PERRY,
Special Agent.

1. What were the breed, number, age, and value of the registered bulls owned by you on June 30, 1886?

Breed.	Number.	Ages.	Value.
Aberdeen-Angus.....
Ayrshire.....
Devon.....
Galloway.....
Guernsey.....
Hereford.....
Holstein-Friesian.....
Jersey.....
Norfolk-Suffolk.....
Shorthorn.....
Swiss.....
West Highland.....

2. Please give the number, breed, age, and value of the registered cows and heifers owned by you on June 30, 1886.

Breed.	Number.	Ages.	Value.
(Same breeds mentioned as in preceding table)

3. What was the *range* of prices received or paid by you at public or at private sale during the year ended with June 30, 1886, for registered bulls of the following breeds?

Breed.	Number transferred.		Range of prices.	
	Public sale.	Private sale.	Public sale.	Private sale.
(Same breeds mentioned as in preceding table)

4. What were the *average* prices received or paid by you at public or at private sale during the year ended with June 30, 1886, for registered bulls of the following breeds?

Breed.	Number transferred.		Average prices.	
	Public sale.	Private sale.	Public sale.	Private sale.
(Same breeds mentioned as in preceding table)

5. What were the *ranges* of prices received or paid by you at public or at private sale during the year ended with June 30, 1886, for registered cows or heifers of the following breeds?

Breed.	Number transferred.		Range of prices.	
	Public sale.	Private sale.	Public sale.	Private sale.
(Same breeds mentioned as in preceding table)

6. What were the *average* prices received or paid by you at public or at private sale during the year ended with June 30, 1886, for registered cows or heifers of the following breeds?

Breeds.	Number transferred.		Average prices.	
	Public sale.	Private sale.	Public sale.	Private sale.
(Same breed mentioned as in preceding table)

7. What are the present cash values in your neighborhood of so-called "scrub" or "native" cattle of the ages mentioned below?

Yearlings, \$——; two-year-olds, \$——; three-year-olds, \$——.

8. What are the present cash values in your neighborhood of "grade" animals sired by bulls of the following breeds?

Breeds.	Half breed.	Three-quarter breed.	Higher breed.
(Same breed mentioned as in preceding table)

9. What increase in weights of bees of the ages mentioned below resulted in your neighborhood from the use of registered bulls of the following breeds?

Breeds.	Yearlings.	Two year-olds.	Three-year-olds.
Aberdeen-Angus
Devon
Galloway
Hereford
Holstein-Friesian
Norfolk-Suffolk
Shorthorn
West Highland

10. What increase in the quantity of milk, butter, or cheese produced per year, per cow, has resulted in your neighborhood from the use of registered bulls of the following breeds?

Breed.	Increase in yield of milk.	Increase in yield of butter.	Increase in yield of cheese.
Ayrshire
Guernsey
Holstein-Friesian
Jersey
Norfolk-Suffolk
Shorthorn
Swiss

11. What is the difference, if any, between the cost per 100 pounds of beef produced by so-called "scrub" or "native" cattle, and that of beef produced by "grade" or improved cattle?

Ages.	Cost of native or scrub beef.	Cost of grade or improved beef.
Yearling
Two-year-old
Three-year-old

12. What is the difference, if any, between the cost per gallon of milk, and of butter and cheese per pound, produced by scrub or native cows, and that of milk, butter, and cheese produced by grade or improved cows?

Articles.	Cost, native or scrub.	Cost, grade or improved.
Milk
Butter
Cheese

13. What is the average duration of productive life of scrub or native cattle in your neighborhood?

Bulls, _____ years; cows, _____ years.

14. What is the average duration of productive life of grade or improved cattle in your neighborhood?

Bulls, _____ years; cows, _____ years.

15. What has been the average duration of productive life of purely-bred cattle?

Bulls, _____ years; cows, _____ years.

16. What has been the average number of calves per cow born of purely-bred cows in your herd?

17. What percentage of the purely-bred calves born in your herd have reached maturity?
 18. What percentage of the grade calves born in your neighborhood reached maturity?
 19. What percentage of the scrub or native calves born in your neighborhood reach maturity?
 20. In what county or counties, and what State or States, are your cattle kept?
 County of _____, State of _____.

U. S. DEPARTMENT OF AGRICULTURE,
 BUREAU OF ANIMAL INDUSTRY,
 Boulder, Colo., _____, 1887.

Hon. _____,
 Governor of _____:

SIR: Having been selected by the Commissioner of Agriculture to collect certain information concerning the sheep industry of the United States, I should be pleased to receive from your office a statement of the number of sheep in your State, as returned by the assessors of the various counties for the year 1886, also their value, together with the number of pounds of wool produced and its value. I would request that this statement be made by counties.

For the purposes of comparison, I should also be pleased to receive a statement showing the aggregate number of sheep in the State and their value, the number of pounds of wool returned and its value for each of the three years next preceding, that is, for 1883, 1884, and 1885.

If your assessors make any return of the manufacture of woolens in your State, information on this point is also solicited. The number of woolen mills, the value of their product, the capital employed, the value of domestic manufactures of wool, etc., are among the matters upon which information is sought.

Please refer this to the proper officer of your State government for reply.

Any statement, at his convenience, covering these and other matters relating to this industry, will be regarded as a favor.

I inclose Department envelope, which will cover your reply free of postage.

Very respectfully,

U. S. DEPARTMENT OF AGRICULTURE,
 BUREAU OF ANIMAL INDUSTRY,
 Boulder, Colo., _____, 188—.

Mr. _____,
 _____:

SIR: I am preparing an article on sheep husbandry for the use of the Commissioner of Agriculture, and one of the matters to which it is desired to give particular attention is the feeding of sheep for market. I understand you have made something of a specialty of this business, and I therefore apply to you for some detailed information concerning it.

In selecting sheep for feeding do you prefer those mainly of merino blood, or those well crossed with the other breeds? Have you noticed any difference in the feeding capacities of each, and is there any material difference in the price or demand between these two descriptions when you come to sell?

Have you had any experience in the feeding of Western sheep, *i. e.*, those from Texas, New Mexico, Colorado, etc., in which the Mexican blood exists to a considerable degree? How do they compare as feeders with the common sheep of the States, and how do they rank in the market when fattened?

Do you confine your operations in this line strictly to winter feeding, or do you also fatten sheep during the summer months, and if so, to what extent do you supplement the pasturage with rations of grain?

During what months do you find it most profitable to purchase sheep for winter feeding, and are the markets generally well supplied with feeding sheep at the season when you would prefer to buy?

About how long a time do you generally feed before marketing?

About what increase in weight do you generally secure during the feeding operations?

About what is the average increase in the market price per hundred pounds of your fatted sheep over the same sheep when you buy them thin?

Is there any preference shown in the market for sheep of a particular size or weight, or between ewes and wethers? Are sheep ever fed too long or made too fat for the best requirements of the market?

What is your general course of feeding? Do you cut your hay or coarse fodder? Do you make it a point to provide any particular kind of hay? What kind of grain do you feed? Do you grind it? And how do you feed it, moistened or dry, alone or

mixed with other feed? How much hay and grain do you estimate you feed per head daily? Do you provide any other description of feed besides hay and grain? Do you regard a supply of roots as essential to successful feeding? Have you any experience in feeding ensilage to fattening sheep?

How are the sheep managed during the course of feeding? Are they confined to sheds or yards, or do they have the range of the fields and pastures? How often are they fed? Is it necessary to divide them into small lots for the best results in feeding?

As a matter of profit, how does the feeding of sheep compare with the feeding of cattle, and what special care and conveniences are necessary to its success? Would farmers of average experience be as likely to succeed in feeding sheep as in feeding cattle? How many sheep do you estimate can be fattened on the same feed as one steer?

Have you had any experience in supplying early lambs for market? Do you produce them from a permanent flock, or from ewes purchased each year for that purpose? Is it necessary that any particular grade of sheep should be secured for the production of such lambs? At what ages are they sold, and in what particular way sent to the open market or to previously secured customers, and what prices do they command? What other information can you give me about this business as a specialty?

Information upon these points, and upon any others relating to the general question of sheep feeding, will be regarded as a favor.

I inclose Department envelope, which will cover your reply without the payment of postage.

Very respectfully,

(Form A.)

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

NOTICE OF QUARANTINE.

—, 188—.

To —, :
— :

You are hereby notified that your cattle, located at —, have been exposed to contagious pleuro-pneumonia, and that — of your cattle are diseased. I hereby, by authority of the act of Congress approved May 29, 1884, and of Rule III of the rules and regulations prepared in accordance with said act, quarantine all of your cattle now in your stables and on your premises a —. And you are forbidden to drive, or move, or allow to stray, or to be driven, or moved, any of said cattle on any public highway, or outside of the following limits:

And you are forbidden to allow any other cattle to come within said limits, or in contact with said quarantined stock. And you are further notified that for any violation of this order of quarantine you will be prosecuted under sections 6 and 7 of the act of Congress approved May 29, 1884, establishing the Bureau of Animal Industry, and under the quarantine laws of the State of —.

Inspector, Bureau of Animal Industry.

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NOTICE OF QUARANTINE

TO

OWNERS OR PERSONS IN CHARGE OF CATTLE

AT

Made —, 188—.

Served on —, 188—.

Inspector.

(Form B.)

U. S. DEPARTMENT OF AGRICULTURE,
 COMMISSIONER'S OFFICE,
 Washington, D. C., ———, 1887.

To THE AGENT OF ———,

You will take notice that in pursuance of section 7 of an act of Congress approved May 29th, 1884, establishing the Bureau of Animal Industry, you are hereby notified that a contagious disease, known as pleuro-pneumonia, exists among cattle in the count ——— of ———, State of ———, in and through which infected district your company is doing business. Said district is hereby declared in quarantine until further notice, and you are hereby directed not to receive for transportation, nor to transport, any cattle from said count ———, in said State, to any other State or Territory, unless such cattle have first been examined and inspected by an inspector of the United States Bureau of Animal Industry, and said inspector gives a certificate in writing that the cattle examined are free from the contagious disease known as pleuro-pneumonia, and have not been exposed to such disease, in which case said cattle so certified to may be transported from said district within forty-eight hours from the time of examination, and not otherwise. Before examining cattle to certify for transportation the inspector must be furnished with an affidavit made by two disinterested persons, stating that they have known the cattle for a period of six months just prior to the examination, and that such cattle have not been exposed to pleuro-pneumonia; that they have not been in any of the buildings, or on any of the premises, or among any of the herds that have been specially quarantined in said district. The inspector may require other proof that the cattle have not been exposed to pleuro-pneumonia, which must be furnished before he gives the certificate.

Your attention is directed to sections 6 and 7 of the act of Congress approved May 29th, 1884, establishing the Bureau of Animal Industry, which sections make it a misdemeanor, punishable by a fine of not less than \$100 nor more than \$5,000, or by imprisonment for not more than one year, or by both such fine and imprisonment, for any railroad company to receive for transportation, or to transport from one State or Territory to another, any live stock affected with any contagious, infectious, or communicable disease, and especially with the disease commonly known as pleuro-pneumonia, or for any person or persons to deliver such affected live stock to any transportation company.

Your attention is also called to the rules and regulations prepared by the Commissioner of Agriculture, by virtue of the authority conferred upon him by section 3 of the aforementioned act, and especially to the 6th, 9th, and 12th rules, a copy of said rules and regulations being herein inclosed.

 Commissioner of Agriculture.

[Back of blank:]

NOTICE OF QUARANTINE

TO

TRANSPORTATION COMPANIES.

To ———,
 ———.

Quarantine of ———,
 ——— Count—,
 State of ———.
 Made ———, 188—.

(Form C.)

U. S. DEPARTMENT OF AGRICULTURE,
COMMISSIONER'S OFFICE,
Washington, D. C., _____, 188-.

To the managers and agents of all railroads and other transportation companies throughout the United States, and other persons :

Notice is hereby given by publication, in pursuance of section 7 of an act of Congress approved May 29, 1884, entitled "An act for the establishment of a Bureau of Animal Industry, to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuro-pneumonia and other contagious diseases among domestic animals," that a contagious, infectious, and communicable disease, known as pleuro-pneumonia, exists among cattle in the count— of _____, State of _____; that all cattle in said infected district are hereby quarantined until further notice, and deemed cattle "affected with a contagious disease," and all persons are prohibited from moving or transporting any cattle from said count— of _____, State of _____, to any other State or Territory of the United States, under penalty of sections 6 and 7 of the above-entitled act: *Provided, however,* That any cattle that have been examined by an inspector of the Bureau of Animal Industry, and by said inspector are certified to in writing as being free of pleuro-pneumonia, may be transported to any other State or Territory from said infected district within forty-eight hours after being so certified to: *And provided further,* That said inspector is furnished with an affidavit made by two disinterested persons, stating that they have known said cattle for a period of six months immediately prior to the examination, and that during that time said cattle have not been exposed to pleuro-pneumonia. Said inspector may require further evidence that the cattle have not been exposed, and such proof as he requires must be given him.

The attention of all persons is called to sections 6 and 7 of the act of Congress approved May 29, 1884, establishing the Bureau of Animal Industry, which sections make it a misdemeanor, punishable by a fine of not less than \$100 nor more than \$5,000, or by imprisonment for not more than one year, or by both such fine and imprisonment, for any transportation company or person to receive for transportation, or to transport, or to drive from one State or Territory to another any live stock affected with any contagious, infectious, or communicable disease, and especially pleuro-pneumonia; or for any person or persons to deliver such affected live stock to any transportation company.

A reward of \$100 will be paid to any person giving information to the Chief of the Bureau of Animal Industry that results in the conviction of any person for a violation of sections 6 and 7 of the act of Congress of May 29, 1884.

Commissioner of Agriculture.

[Back of blank:]

NOTICE OF QUARANTINE

FOR

PUBLICATION.

Quarantine of _____.
Made _____, 188-.

(Form D.)

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

CERTIFICATE OF APPRAISEMENT.

We, the undersigned, having been duly convened as a board of appraisement in the manner provided for by Rule 8 of the rules and regulations for the suppression of pleuro-pneumonia, under act of Congress approved May 29, 1884, do hereby certify that we have examined the following-described animals, the property of _____,

of _____ County, State of _____, said to be diseased with contagious pleuro-pneumonia, and find their value to be _____.

and have examined the following-described animals, the property of _____, said to have been exposed to contagious pleuro-pneumonia, and find their value to be _____.

This appraisement is based on the current market value of the animals, as healthy animals, and without considering the fact of the existence of contagious pleuro-pneumonia among them or of their exposure to contagious pleuro-pneumonia.

Subscribed and sworn to before me this _____ day of _____, 188-.

[Back of blank:]

APPRAISEMENT
OF
CONDEMNED CATTLE.

Property of _____,

Approved: _____

Inspector.

(Form E.)

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

OATH AND ACCEPTANCE BY OWNER.

_____, of _____ County, State of _____, being duly sworn, makes oath: That he is the owner of the following-described cattle:

That said cattle have been condemned to be slaughtered as diseased with contagious pleuro-pneumonia, and as having been exposed to contagious pleuro-pneumonia, by order of an inspector of the Bureau of Animal Industry. That said cattle have been duly appraised by a board of appraisers, and their total value fixed at the sum of _____ dollars, provided they were not diseased with contagious pleuro-pneumonia, or had not been exposed to the same. That he agrees to accept _____ of the total appraised value of said animal, to wit, the sum of _____ dollars, as full compensation for their slaughter by the United States Bureau of Animal Industry, and will release and does hereby release any and all claims and demands of any kind or nature whatsoever he may have against the United States caused by quarantining, taking, and killing of said animals. He further makes oath that he is the sole owner of each and all of said animals, that no other person or persons have any claim or interest in the same, and there are no mortgages or liens held by any one against them.

Subscribed and sworn to before me this _____ day of _____, 188-.

[Back of blank:]

RELEASE
OF
APPRAISED CATTLE.

Owner _____,
_____ County,
State of _____,
Approved: _____, 188-.
Voucher No. _____.

_____, 188—.

I, _____, governor of the State of _____, and chief executive officer thereof, do hereby acknowledge the receipt of the rules and regulations certified to by the Commissioner of Agriculture of the United States as having been prepared by him April 15, 1887, in pursuance of the authority of section 3 of an act of Congress, approved May 29, 1884, establishing the Bureau of Animal Industry, and further acknowledge the receipt of the invitation to the executive authority of the State of _____ to co-operate in the enforcement of the provisions of said act and of said rules and regulations.

And on behalf of the State of _____, and by virtue of my authority as the chief executive officer thereof, I do hereby accept the rules and regulations prepared by the Commissioner of Agriculture, April 15, 1887, for the suppression and extirpation of contagious diseases of animals, and agree that the executive authority of the State of _____ will co-operate with the Bureau of Animal Industry in carrying out the provisions of the act of May 29, 1884, to the full extent of its authority; and that I will direct the sheriffs and other peace officers of the State to render all necessary aid and assistance to the inspectors of the Bureau of Animal Industry in the performance of the duties imposed upon them by the said rules and regulations.

Governor of the State of _____,

Hon. NORMAN J. COLMAN,
Commissioner of Agriculture, Washington, D. C.

No. _____.

PERMIT

TO

TRANSPORT ANIMALS.

Permit granted to _____ to ship _____ head of cattle from _____ to _____ via _____.

Date: _____.

[In duplicate.]

No. _____.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

PERMIT TO TRANSPORT ANIMALS FROM QUARANTINED DISTRICTS.

Place and date of inspection _____.

_____, 188—.

Where from _____.

Date of shipment _____, 188—.

This is to certify that I have this day examined the following-described animals, to wit:

the property of _____, and to be shipped to _____.

I find the same to be free of evidences of contagious diseases, and am satisfied by accompanying proof that they have not been exposed to contagious pleuro-pneumonia within the last six months.

Permission is hereby granted, therefore, to ship said animals from

to any other State or Territory of the United States, if the same are removed within the next forty-eight hours and meanwhile do not come in contact with animals other than those declared by my permit free of disease.

Dated at _____, this _____ day of _____, 188—, — m.

_____,
Inspector.

Remarks:

[Back of blank:]

AFFIDAVIT OF CITIZENS.

We, _____ and _____, having been first duly sworn, each for himself makes oath that he is a citizen of _____, State of _____; that he has known the following-described cattle, to wit:

the property of _____ for the past six months; that he has personal knowledge that said cattle have not been exposed to pleuro-pneumonia, and that they have not come in contact with any animal or herds known or suspected to be affected with pleuro-pneumonia, during the past six months.

Subscribed and sworn to before me by the said _____, this _____ day of _____, 188—.

AFFIDAVIT OF OWNER.

_____, being duly sworn, makes oath that he is the owner of the cattle described in the above affidavit, and that he desires to ship them to _____, and that they are the identical cattle offered for shipment; that they have not been exposed to contagious pleuro-pneumonia during the past six months to the best of his knowledge and belief.

Subscribed and sworn to before me by the said _____, this _____ day of _____, 188—.

(Form H.)

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

Bureau _____ report:

Statement showing work done in districts affected with pleuro-pneumonia, as shown by inspectors' reports received at Bureau _____, 188—.

Place.	Inspection.		Quarantines.				Appraisements.				Post-mortem.		Disinfections.	Quarantine released.	Transportation permits.	Special work.
	No. of.	No. in herds.	No. of.	No. in herds.	No. diseased.	State.	No. exposed.	Value.	No. diseased.	Value.	Total value.	No. killed.	No. diseased.			

(Form G.)

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

SLAUGHTER AND POST-MORTEM REPORT.

Place, _____.
 Date, _____.
 Owner, _____.
 Premises, _____.
 No. animals killed, _____.
 No. animals found diseased, _____.
 Where slaughtered, _____.

No. or name of animals.	Acute.	Chronic.	Lung hepatized.	Lung adherent.	Lung encysted.

Inspector.

(Form K.)

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

RECORD OF QUARANTINED ANIMALS UNDER RULE 5.

State, _____.
 County, _____.
 Owner, _____.
 Premises _____.
 Date of quarantine, _____, 188—.

No. of lock or tag.	Kind.	Remarks.

 Inspector.

U. S. DEPARTMENT OF AGRICULTURE,
 COMMISSIONER'S OFFICE,
 Washington, D. C., May 31, 1887.

To the managers of all railroads and transportation companies in the United States :

Your attention is called to the fact that contagious pleuro-pneumonia exists among cattle in the States of Illinois, Maryland, and New York, and that the infected districts in said States have been duly quarantined by the Department of Agriculture in the manner provided by the act of Congress of March 29, 1884, establishing the Bureau of Animal Industry.

The existence of this contagious disease in such important cattle centers as these States is a danger so menacing to the cattle interests of the United States that it calls for the most prompt, thorough, and energetic measures that can be taken, not only by the National Government, but also by all parties interested in the preservation of the great cattle industry of the country.

No persons or class of persons are more interested in the safety and growth of this industry than transportation companies, who derive a very large proportion of their earnings from the shipment of cattle and their products, and none should be more active and energetic in enforcing such measures as are necessary to stamp out this disease, and prevent its possible spread.

The insidious character of this disease, its easy and imperceptible propagation by contact with animals having the germs of disease and giving no outward symptoms of its presence, the contraction of the plague from infected cars, the spreading of the germs by means of manure carried in uncleansed cars from place to place, all make it a matter of grave concern, and render it necessary that stringent measures should be adopted to protect the cattle interests of the country from this great evil.

I have, therefore, to suggest and to request that all transportation companies shall establish on their respective lines a rule, and see that it is rigidly enforced, that all cars that have carried live stock shall be thoroughly cleansed on the discharging of their freight, and not allowed to leave the freight or stock yards before this is done. Also that the said cars shall be carefully disinfected in the following manner :

1. Remove all litter and manure.
2. Wash the car with water thoroughly and until clean.
3. Saturate the walls and floors with a solution made by dissolving 4 ounces of chloride of lime to each gallon of water. Stock yards and pens should be cleansed and disinfected at least once a week.

Transportation companies having connections with infected districts should require parties offering cattle for shipment to present at point of loading affidavits of the owner and two disinterested persons stating that the cattle to be shipped have been known to affiants for at least six months next preceding, and that said cattle have not been in any of said districts, and have not come in contact with any cattle from said districts. Said affidavits should be attached to and accompany the way-bill to point of destination.

As several very extensive outbreaks of pleuro-pneumonia have recently been traced to cattle that had been shipped from infected districts a considerable distance by rail,

the necessity of these precautions cannot be overestimated, and, if enforced, they would be a material safeguard against the spread of this disease.

Railroad companies can be of the greatest assistance to the Bureau of Animal Industry in its work of extirpating pleuro-pneumonia, if they will co-operate with it and assist in maintaining the Rules and Regulations prescribed by me on April 15, 1887, and the quarantine orders since made.

I hope this support and assistance will be cordially given.

Very respectfully,

NORMAN J. COLMAN,
Commissioner of Agriculture.

INSTRUCTIONS TO INSPECTORS OF THE U. S BUREAU OF ANIMAL INDUSTRY.

1. Inspectors are to carefully study and familiarize themselves with the rules and regulations prepared by the Commissioner of Agriculture, of date April 15, 1887, and follow them strictly in carrying out the work they are detailed to do by the Chief of the Bureau.

2. No step or action of any kind is to be taken by any inspector without first receiving *express instructions* from the Chief of the Bureau, except as is provided for in Rule 3.

3. They will promptly make the reports called for by the rules, giving the fullest information possible of the facts relating to each case, and make all suggestions that they think proper, in order that the Chief may be fully advised, so as to issue the proper instructions. Should they at any time be in doubt as to the proper action to be taken they will ask for further orders, and explain the difficulty. In all cases of importance, and whenever they believe the circumstances require immediate action, they will use the telegraph in requesting orders.

4. As there exists much hostility among owners of animals to the work intrusted to this Bureau, inspectors are to act with the utmost caution and civility in the performance of their official duties. They will avoid as far as possible all assumption of authority in making examinations and inspections of animals and premises; first requesting as a *favor* or *privilege* permission to examine, and endeavor to persuade owners and persons in charge to grant the same. It is the wish of the Bureau to allay all the opposition, if possible, that may exist as to its work, and have its officers secure the friendly aid and assistance of those for whose benefit the law has been made. The Bureau believes that its inspectors can secure this by being courteous and avoiding unnecessary friction with the public. Should an inspector fail in this manner in obtaining permission to make an examination, he will then present a copy of the rules and regulations of April 15, 1887, together with the act of Congress of May 29, 1884, to the owners or persons in charge, and quietly but firmly insist upon making the examination. If permission is still refused the inspector will proceed to enter the premises and make the examination. But should any force, or show of force, or threats of force, be made against the inspector, in his attempt to enter on the premises or to make the examination, he will relinquish the attempt and report at once all the circumstances fully to the Chief of the Bureau as provided in Rule 11, and wait for orders. The Chief will then direct him as to whether he shall secure the assistance provided for by said rule.

5. Inspectors will prepare and carefully keep a daily journal. In this will be stated daily each and every act done by the inspector, giving the fullest detail of his work, the name and residence of the owners of animals inspected, the character of animals and their condition, and the character and condition of the premises in which they are kept; the attitude of owners towards the work of the Bureau, and any other information he may think will be of interest. In case of contagion, as far as can be obtained, a history of the animals diseased, how, if known or conjectured, they contracted the disease, number in herd, number quarantined, date of quarantine, and all other particulars useful to be known.

Also a register in which is to be entered a brief statement of work done each day, ruled and filled out in like manner as blank Form F for the daily reports.

6. It is necessary that the Bureau shall be kept fully advised daily of the progress of all work being done by inspectors. To accomplish this purpose daily reports—Form F—are to be made out and forwarded to the Bureau. These reports are to be made by the chief inspector of each district, or by the inspector in charge of work at any place. All inspectors at work under a chief inspector will forward daily to said chief inspector all reports required by the rules and instructions, who will from said reports make up his daily report, and forward it to the Bureau, together with all the reports, vouchers, etc., received by him from inspectors under his charge. When no work of the kind specified on the blank has been done in the district or place for which the report is made, that fact will be so stated on the report, and also a statement of what work is being carried on. In addition inspectors in charge are re-

quired from time to time to forward written reports of the cases they and those under them are at work upon, and progress being made in the same, in like manner as heretofore.

7. Notice of temporary quarantines provided by Rule 3 will be made in duplicate. One copy to be served on the owner or persons in charge of the animals, the other indorsed with the time, place, and person on whom served, to be forwarded to the Bureau. The inspectors will also keep a record of the same. This is to be done whenever a herd is found infected. Inspectors will also see that the State authorities place the State quarantine on the infected herd. *Both quarantines are required*; the first to prevent the quarantined animals leaving the State; the second to prevent them from being moved to other places within the State. Inspectors will notify the Bureau of the date that the State quarantine of the herd is made.

8. When the diagnosis of this disease has been confirmed in the manner provided by Instruction 12, the animals of the herd quarantined are to be locked, or tagged, and numbered. A report of this record as specified in Rule 5 will be made and sent to the Bureau on blank Form "K."

9. In convening boards of appraisement under Rule 8, the certificate of appraisement is to be made and sworn to in duplicate, one copy to be for the benefit of the owner, the other to be at once forwarded to the Bureau. Whenever it is impossible to have the oaths administered to the appraisers and owners by a notary public or justice of the peace, the signatures of the appraisers to Form "C," and of owners of Form "E," may be attested by a witness. This, however, is to be done only in cases where an agreement as to price is made with the owner, and he does not object to the killing of his cattle. Appraisers are to be directed that cattle are not to be valued at more than they would bring at public auction, and when appraisements are made in excess of such values in the judgment of the inspector he will disapprove such appraisements and convene a new board. In all cases where possible it will be best, before the appraisement is made, to secure the owner's consent to the maximum valuation that will be approved. Whenever owners object to the killing of their cattle, and no amicable arrangement can be made, inspectors will pursue strictly the mode and manner of making appraisements as prescribed by the rules and regulations and the law of the State in which it is to be made.

10. No animal shall be killed unless expressly ordered by the Chief of the Bureau, which order will be sent after the appraisement of the animal is approved and the amount to be paid to the owner shall have been fixed by the chief, and a release and quit-claim of all demands against the United States has been signed by the owners. Blanks for this purpose will be furnished inspectors, Form E.

11. A *post-mortem* examination must be made of every animal killed, and a report of the result of such examination must be made in writing to the Chief of the Bureau. It must state name of owners, character of animal, date of the quarantine, and the number of animal quarantined, if chained and locked, or numbered in any other way. These reports are to be forwarded with the daily reports.

12. Whenever an inspector discovers the existence of pleuro-pneumonia he will, in addition to reporting in the manner provided by the rules, likewise report it to the chief inspector of his district. The chief inspector will himself proceed to the locality for the purpose of verifying the diagnosis, or in case of his being otherwise engaged, the Chief of the Bureau will detail another inspector to make the verification. The result of this examination should be reported at once to the Bureau. Should the diagnosis be confirmed a notice of the fact of the discovery of pleuro-pneumonia is to be sent at once to the State veterinarian, or Board of State Sanitary Commissioners, and an invitation extended to them to make an examination and co-operate with this Bureau.

13. It is deemed necessary and essential that the utmost harmony and friendly relations should exist between the officers of this Bureau and State officers, and that hearty co-operation be secured. Inspectors are requested to do everything in their power to maintain such relations, and to consult with and receive from State officers all suggestions and assistance that can be obtained. All friction is to be avoided.

14. The certificate provided for in Rule 12 is to be made in duplicate, one copy to be given to the shipper and the other to be forwarded to the Bureau. These certificates have on the backs the affidavits for the citizens and owners to make oath to, and are to be executed in duplicate. When additional proof is required by the inspector, such proof is to be forwarded with the duplicate certificate, or permit, to the Bureau.

15. The reports provided for by these instructions are to be commenced and forwarded on and after June 1, 1887.

16. These instructions may be from time to time altered, amended, or suspended by the Chief of the Bureau in his discretion, and special instructions to govern particular cases will be sent as the circumstances may require.

D. E. SALMON,
Chief of Bureau,

WASHINGTON, D. C., May 27, 1887.

(Form L.—In duplicate.)

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

RELEASE OF QUARANTINE.

To _____, 188-.

Owner of Premises _____,
County of _____, State of _____:

You are hereby notified that all the cattle on the above-described premises, diseased and exposed to disease, having been slaughtered, and the said premises having been disinfected under the supervision of an inspector of the Bureau of Animal Industry, and _____ days having elapsed since said disinfection, the said premises are believed to be free from contagion, and the quarantine of the same is hereby removed.

Permission is therefore granted to you to admit new animals on said premises, provided no animal shall be admitted that comes from any infected district that is under quarantine by order of the Commissioner of Agriculture, unless such animal has been inspected by an inspector of the Bureau of Animal Industry, and declared to be free from disease, and is accompanied by a permit of transportation signed by such inspector.

[Back of blank:]

_____,
Inspector.

RELEASE OF QUARANTINE.

Owner _____.
Premises _____.
County _____,
State of _____.
Date _____, 188-.

Recorded: _____, 188-.

_____,
Inspector.

No. 199. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.,
UNITED STATES CATTLE QUARANTINE.

Permit _____, or agent, to ship on or about _____, _____ at _____
_____ cattle, for _____, U. S. A.

Present this to American consul at _____.
_____, Commissioner.

No. 199. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.,
UNITED STATES CATTLE QUARANTINE.

Permit _____, or agent, to land and quarantine _____ cattle at _____
_____ station, to arrive on or about _____, _____.

Present this to the superintendent in charge of station.
_____, Commissioner.

No. 199. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.,
UNITED STATES CATTLE QUARANTINE.

Permit _____, or agent, to quarantine _____ cattle at _____
station, to arrive on or about _____, _____.

Permission granted this day.
_____, Commissioner.

No. 501. No. 501. U. S. CATTLE QUARANTINE STATION, _____, 188-.

Be it known to all whom it may concern, That _____ cattle, belonging to _____ and shipped from _____ per S. ship _____ have been quarantined at this station, according to regulations for importing neat cattle into the United States.

The above cattle being free from infectious or contagious disease, and having fulfilled all the requirements of the law governing cattle quarantine stations, are this day, by my order, released.

CIRCULAR.—IMPORTATION OF NEAT CATTLE.

U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., August 25, 1884.

To collectors of customs and others :

The following conditions for the observance of importers and owners of neat cattle and others are prescribed by the Department of Agriculture, to which the quarantine system has been transferred by the Secretary of the Treasury, with instructions that "hereafter all regulations governing such quarantine will be issued by the Commissioner of Agriculture."

Neat cattle arriving in the United States from any part of the world, except North and South America, can be landed only at such ports on the Atlantic sea-board as are at the time provided with cattle-quarantine accommodations, under the control of officers of the Department of Agriculture.

Any person contemplating the importation of such cattle must first obtain from the Department of Agriculture at Washington two permits, one stating the number and kind of animals to be imported, the port and probable date of shipment, which will entitle them to clearance papers on presentation to American consul at said port of shipment; the other stating the port at which said cattle are to be landed and quarantined, and the approximate date of their arrival, and this will assure the reception of the number and kind specified therein at the port and quarantine station named, at the date prescribed for their arrival, or at any time during three weeks immediately following, after which the permit will be void.

These permits shall in no case be available at any ports other than the ones mentioned therein. Permits must be in the name of the owner of or agent for any one lot of cattle. When more persons than one own a lot of cattle for which permits have been issued, a release from quarantine will be given to each owner for the number and kind he may own, and this release will be a certificate of fulfillment of quarantine regulations.

Permits will be issued to quarantine at such ports as the importer may elect, so far as facilities exist at such ports, but in no case will permits for importation at any port be granted in excess of the accommodations of the Government quarantine at such port.

Every importer shall, on the day of the shipment from a foreign port, telegraph to the Commissioner of Agriculture the number of cattle shipped, the vessel upon which they are shipped, and the port at which they are to be landed.

United States consuls at foreign ports are hereby notified to give clearance papers or certificates for importations of cattle only upon presentation of permits as above provided, with dates of probable arrival and destination corresponding with the said permits, and in no case for a number in excess of that mentioned therein.

The ports now provided with quarantine stations under the control of the Treasury Department, and at which cattle may be landed subject to the foregoing conditions, are Portland, Boston, New York, Baltimore, and such additional ports as may be provided with quarantine accommodations approved by the Commissioner of Agriculture and supervised by the proper officers.

GEO. B. LORING,
Commissioner of Agriculture.

Approved :
CHAS. E. COON,
Acting Secretary of the Treasury.

(Form F.—In duplicate.)

No. _____.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

DAILY REPORT OF INSPECTORS.

District, _____.

Inspector, _____, _____, 188—.

	Number.	Remarks.
Inspections	
National quarantines ordered	
State quarantines ordered	
Animals appraised	
Animals released (Form E)	
Animals slaughtered	
Vouchers for cattle	
Post-mortems made	
Post-mortems showing disease	
Transportation permits granted	
Premises disinfected	
Quarantines released	
Special investigations	

I inclose inspection reports, duplicates of quarantine notices, appraisements, releases by owners (Form E), vouchers for slaughtered animals, post-mortem reports, and transportation permits corresponding with numbers given in above report, or where they do not correspond an explanation is given under head of Remarks. I also give under head of Remarks the names of owners and premises where State quarantines have been ordered and where disinfection has been practiced.

_____,
Inspector.

DAILY REPORT OF INSPECTORS.

From _____.

State of _____.

Date _____.

_____,
Inspector.

Received at Bureau _____, 188—.

Compared and entered _____, 188—.

U. S. DEPARTMENT OF AGRICULTURE,
COMMISSIONER'S OFFICE,
Washington, D. C., March 1, 1887.

Ordered, That from and after April 1, 1887, the term "traveling expenses," as it occurs in the appointments of employes of the Bureau of Animal Industry, will be construed to include board and lodging for not longer than thirty consecutive days in any one place. When employes are stationed at a town or city for a longer period than thirty days they will be expected to obtain subsistence at their own expense after that time.

NORMAN J. COLMAN,
Commissioner.

United States Department of Agriculture, Bureau of Animal Industry.—Instructions in regard to accounts.—Washington, D. C.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

INSTRUCTIONS FOR EMPLOYÉS.

Employés should thoroughly familiarize themselves with these instructions, as all items of expenditure not in conformity with them will be disallowed and strict compliance will greatly facilitate settlement.

The official oath must be taken before services can begin or expenses are incurred.

TRAVELING EXPENSES.

1. To authorize the payment of traveling expenses an employé must receive a commission signed by the Commissioner of Agriculture or Acting Commissioner, specifying the places to be visited and for what purpose.

2. A copy of this commission must be filed with the account when presented for settlement.

3. The term "traveling expenses" is confined to those which are usual and essential to the ordinary comfort of travelers and such other expenses as are necessary to accomplish the object of the commission. It includes such items as railroad fare, sleeping-car berth, going to and from the station, transfer of baggage, meals on train, meals and lodging when stopping transiently, etc.

4. Any one staying longer than thirty days at one place will be expected to obtain subsistence at his own expense after that time.

5. When unusual expenses are incurred a brief explanation of their necessity should accompany the account, which will be allowed if approved by the head of the Department.

6. Any person traveling on public business over any railroad west of the Missouri River should, before starting, apply for transportation orders and special railroad instructions, stating what roads he expects to travel over.

RECEIPTS

1. A memorandum should be kept, noting each item as it occurs, and receipts taken, when possible, to be attached to the voucher as sub-vouchers. Books of receipts are furnished on application.

2. Hotel expenses must be verified by itemized bills, giving time and rate of charges, and signed by the proprietor or by the cashier as "cashier," or clerk as "clerk," or manager as "manager."

3. In all cases except hotel expenses receipts and bills must be signed by the person to whom the money is really due, and not by an agent, unless the legitimate evidence of his authority to receipt for is filed with the account.

4. The best policy to pursue in all cases, except hotel expenses, is to use the receipts furnished by the Department and have them made out in the name of and receipted by the person with whom the dealings are had, with no other name appearing on the receipt. By adopting this plan many delays and disallowances will be avoided.

5. Receipts should be written in ink.

6. Initials should always be a part of the signature.

7. Receipts are not necessary for a single meal.

TELEGRAMS.

1. All Government messages should be endorsed "U. S. official business."

2. All telegrams to this Department should be sent C. O. D.

3. Copies of telegrams with receipts for charges should be filed with accounts as sub-vouchers.

4. Any money paid in excess of "Government rates" will be disallowed.

5. GOVERNMENT RATES.—In computing the number of words the date is always excluded, but the address and signature always included.

For 1,000 miles or less, twenty words or less, 20 cents, and 1 cent for each word over twenty. For each additional 100 miles or fraction thereof, one-tenth in addition to the charge for 1,000 miles.

The charge for twenty words or less can not be greater than 50 cents for any distance.

NIGHT MESSAGES.—Twenty words or less, 2,000 miles or less, 15 cents; over 2,000 miles, 25 cents; 1 cent for each additional word in each case.

METHOD OF MAKING OUT ACCOUNTS.

1. Accounts should be rendered monthly and include salary and expenses from the first to the last day of the month, and should never run from one month into another.

2. If appointed at a certain rate per diem, the statement should begin:

"For salary and expenses as an employé of the Bureau of Animal Industry for the month of —, as follows: Services rendered on the following days: 1st, 2d, 3d, 4th, etc. (omitting Sundays), — days, at \$— per diem.....\$—
Expenses as follows: (etc.).....\$—."

3. If appointed at a certain rate per month, or per annum, the statement should begin:

"For salary and expenses as an employé of the Bureau of Animal Industry for the month of —, as follows: For services rendered during the month of —, at \$— per month (or per annum)\$—
Expenses as follows: (etc.).....\$—."

4. Expenses should come in chronological order, with dates for each item, with references by number to the sub-vouchers (*i. e.*, receipts, etc.) attached.

5. The notary fee is allowed when there are traveling expenses, and should be the last item.

6. Sign the receipt on the line at the bottom, leaving other spaces blank.

7. Make out a duplicate of the voucher with references to the sub-vouchers; no duplicates of sub-vouchers are necessary.

8. Attach a copy of your commission, receipts, copies of telegrams, hotel bills, etc., in the order of the numbered references in the voucher.

9. Upon the back of the voucher will be found a blank form of an oath. When the salary is at a certain rate per diem, or where there are traveling expenses, sign on the blank line and have a notary public administer the oath, leaving all other spaces blank to be filled in by the disbursing officer.

10. If a notary public is not obtainable, apply to a justice of the peace having a seal. If that is impossible, it is necessary to furnish a certificate of a justice of a court of record that the person administering the oath has authority to do so.

11. Address all communications concerning accounts to Hon. Norman J. Colman, Commissioner of Agriculture, Washington, D. C., and on the upper left-hand corner write "Bureau of Animal Industry."

MISCELLANEOUS.

1. Reports as to progress of work assigned should be made to the Commissioner at least once a month, unless otherwise ordered.

2. Paper, envelopes, receipt books, etc., for official business will be furnished upon application.

[The amount due for monthly salary as adopted by the Treasury Department will be found opposite each month under salary paid per annum.]

Month.	Salary \$1,400.	Salary \$1,500.	Salary \$1,600.	Salary \$1,800.	Salary \$2,000.
January.....	\$120.60	\$129.20	\$137.60	\$155.00	\$172.20
February.....	108.80	116.60	124.40	140.00	155.60
March.....	120.60	129.20	137.60	155.00	172.20
April.....	115.40	123.60	131.90	148.30	164.80
May.....	119.20	127.80	136.20	153.40	170.40
June.....	115.40	123.60	131.90	148.30	164.80
July.....	117.90	126.40	134.80	151.60	168.50
August.....	117.90	126.40	134.80	151.60	168.50
September.....	114.20	122.20	130.40	146.80	163.00
October.....	117.90	126.40	134.80	151.60	168.50
November.....	114.20	122.20	130.40	146.80	163.00
December.....	117.90	126.40	134.80	151.60	168.50

DIVISION OF ENTOMOLOGY.

CLASSIFICATION OF THE WORK.

In order to give the desired information accurately and to avoid repetition it will be best to consider the work of this division under three distinct branches or sections, viz: (1) The divisional work proper; (2) the work in silk-culture; (3) the work in ornithology.

(1) THE WORK OF THE DIVISION PROPER.

AIMS AND OBJECTS.—It may not be amiss in this connection to prelude my answer by a brief statement of the aims and objects of the division, especially as they are not very well understood by those unfamiliar with the actual facts.

The primary object of the entomologist is to study the habits of insects injurious to agriculture, and also the best means of counteracting their ravages. Up to 1878 there was in reality no entomological division, but simply an officer known as the entomologist at a salary of \$1,900 per annum, who was assisted by a clerk detailed for that purpose.

It was not required of the entomologist, nor would the appropriation permit, that he should visit the fields and study and experiment; and as was stated by Mr. James W. Swank, in his pamphlet on the "History and Objects of the Department of Agriculture," published in 1872, the chief duty of the entomologist used to be to communicate information to correspondents which was largely drawn from other sources and other authors.

The entomologist, with his assistants and field agents, devotes his time to giving needed information in the warfare which the cultivators of the soil have constantly to make against these injurious insects. The importance of this work may best be understood when we consider the vast number of insects that affect our agriculture and the immense losses which they occasion.

In no way can the importance of this subject be so readily realized as by a glance at some well-established figures regarding losses occasioned by insects, reduced to dollars and cents.

The loss in New York State from the wheat-midge in 1854 amounted to \$15,000,000, and in Ohio it was even greater.

In 1864 the damage done by the chinch-bug in the Mississippi Valley amounted to \$73,000,000.

In 1874, in Missouri, the same insect injured the crops to the extent of \$19,000,000. The Rocky Mountain locust, in 1874, damaged the crops of four States to the amount of \$56,000,000.

In 1875 the same insect occasioned the loss of \$15,000,000 in twenty-six counties of Missouri alone.

The cotton worm occasioned an average annual loss before the war of \$15,000,000, and as late as 1882 the loss reached nearly to \$8,000,000.

There is, in fact, no crop of any kind that is not subject to the attacks of its insect enemies, in many cases either so numerous in species or individually so strong in numbers that the farmer finds that the question of profitable agriculture is simply a question of the mastery of his insect foes.

The most careful estimates have placed the aggregate annual loss to American agriculture, in its broadest sense, from the injuries of insects, at from \$3,000,000 to \$4,000,000, a sum which seems at first blush so enormous that it strikes one as inaccurate; but notwithstanding the losses have been measurably decreased by important remedial discoveries, so far as the worst pests are concerned, the total loss will still remain enormous.

America is in fact a paradise for injurious insects. In no other country on the face of the globe do injuries from this cause assume the proportions that they do here. Three causes for this are manifest: (a) The extensive and constant importation of injurious insects from abroad; (b) the increased destructiveness of insects so introduced; (c) the large areas devoted to special crops.

Insects outnumber plants in the ratio of 5 to 1, and it is safe to say that three hundred thousand species are known, and very many yet remain to be described. A large proportion of these may be classified as injurious.

Accepting as an axiom that in the vast majority of cases the habits of an insect must be known before a remedy can be intelligently suggested, the practical necessity for the study of these habits becomes at once apparent, while the value of the study of applied or experimental work on remedial measures is self-evident.

The work of the entomological division ramifies in various directions, and these various ramifications are comprehended under the present administration. Thus original experiment and investigation are now being made, not only in the study of the habits and best means of destroying the insects which affect both the field, garden, orchard, and forest, but such also as may promote and solve some of the unsolved problems, whether in bee culture or silk culture.

The result of these investigations and the information at present in our possession upon this subject in its various branches are daily communicated to inquirers and correspondents, and the time of the entomologist and his office assistants is largely taken up in such correspondence. This information, conveyed by correspondence, in itself requires a vast amount of time and knowledge, if satisfactorily given, and while an essential part of his duties, I have always looked upon it as secondary to original investigation, and to the discovering of new facts and improved methods,

which, by being published, shall be productive of still greater good, and many important facts are thus annually obtained, and many new devices and methods discovered, as the reports of the Entomologist indicate.

A number of special investigations upon prominent insects or upon the insects of given crops have been conducted and carried to successful conclusion during the past eight years of the work of the division, and yet this fact can not in any way be considered as lessening to any appreciable degree the work still to be done. A glance through the successive reports will show that a large proportion of the insects treated have never before been known as injurious. No fact, indeed, is better established than that almost any plant-feeding species may suddenly become enormously increased in number and consequent destructiveness. Such species alone necessitate the constant work of the division, while the ever-recurring outbreaks of the older pests require not only the constant dissemination of information on their habits, but also constant experimentation upon new and more efficient remedies. The insect enemies of nearly all of our important crops still need careful and systematic work. Many agricultural industries and many special crops, such as the fruit crop of California, the truck-gardening of the South, the barley and oat crops, the hop industry, and many others, have received yet but little attention from entomologists.

Nearly the entire bulk of this work will fall upon the division. But three of the States have appointed salaried State entomologists, and these officers have but slight facilities for investigations. In fact, the correspondence of the division is as great with each of these three States as with almost any of the others which do not give State encouragement to such investigations.

With the growth of the country and of the Department the work of this division has steadily increased since I first took charge of it in 1878, and the following statement will give a very good idea of its scope and of its work during the period mentioned in the circular.

CLASSIFICATION OF THE WORK OF THE DIVISION PROPER.

The business transacted in the Division of Entomology, or the work performed by the force employed, may be divided into five main classes: (1) Correspondence with persons desiring information concerning particular insects or upon economic entomology in general; (2) the care of the insects sent in by correspondents and by field agents and the study of their life-habits in confinement; (3) the mounting and preserving of specimens of injurious and beneficial insects; (4) the study of the habits of injurious species in the field, including experimentation with remedies; (5) the preparation of original reports, the editing of reports of agents, the preparation of illustrations, and the necessary proof-reading.

Results in Class 1 (correspondence) during periods specified.—In the year from January 1, 1884, to January 1, 1885, there were answered by letter 1,884 inquiries concerning destructive insects.

From January 1, 1885, to January 1, 1886, there were answered by letter 2,399 such inquiries.

From January 1, 1886, to January 1, 1887, there were answered 2,396 such inquiries.

From January 1, 1887, to March 1, 1887, there have been answered 374 such inquiries.

It should here be stated that it is the aim to make the answers to such letters of inquiry full and satisfactory, and that in many cases a single letter will require research for many days before it can be satisfactorily answered.

Letters received are filed, after answering, in a sixteen-drawer "Globe file case." This is temporary, however, and as the drawers become crowded the files are removed and placed in the permanent cases. All letters possessed of any especial interest or importance are stamped, in addition to the ordinary dating stamp, with the words, "To be copied" and "To be catalogued by author and subject." Such letters are copied by one of the clerks, together with the answers, and are slip-catalogued by author, subject, and date. The original letters are then filed in the customary manner, the copies are placed in a special cover for future use (publication if found desirable), and the catalogue cards are placed in their proper places in a card catalogue of the correspondence.

All type-written and manuscript answers to letters are copied in books of 500 pages each. Many inquiries can be answered in full by transmitting bulletins of the division containing accounts of the insect or insects in question, and where this can be done it is adopted to save time.

The division has also issued a series of circulars by which certain inquiries can be answered, or certain questions asked. This series up to date consists of 27 numbered circulars. Of these, Nos. 1, 2, 3, 4, 5, 6, 9, 15, 17, 21, 23, and 25 refer to the distribution of silk-worm eggs, and give information in cocoon-raising; No. 7 describes the method of growing mulberry trees; No. 8 gives information concerning silk-culture

experiment stations; Nos. 10, 11, 12, 13, and 19 refer to entomological documents; No. 16 is a circular of inquiry regarding the periodical cicada; Nos. 18, 20, 24, and 27 are announcements and circulars of inquiry respecting the branch of economic ornithology; No. 22 is an announcement circular relative to the apicultural experiment station; and No. 26 refers to the purchase of cocoons by the Department.

Results in Class 2, care and study of living specimens, during the periods specified.—In the year from January 1, 1884, to January 1, 1885, the life-habits of 290 species of insects that were new to my note-books or those of the division were studied in detail in the vivaria of the division.

In the year from January 1, 1885, to January 1, 1886, 253 species were so studied.

In the year from January 1, 1886, to January 1, 1887, 211 species were so studied.

In the period from January 1, 1887, to March 1, 1887, 38 species have been so studied.

These numbers indicate only the new species studied, but additional observations upon hundreds of injurious species previously recorded in the notes are made each year.

Results in Class 3, mounting and care of museum material, during the specified periods.—The accessions to division in the way of specimens are made by the collecting of the individual members of the office force, by field agents, and by correspondents. Much of the material is of only transient interest, and where already represented in the collections is thrown away. All that is of value is preserved, though there is no system in operation whereby these accessions are recorded except so far as they prove new to the Entomologist or to the collections, and need further study. In such cases each species is numbered and a series of notes made in connection with such number during the whole period that the insect is being observed or studied. When I first took charge of the division I brought with me from Missouri all my own notes, which have ever since been used in the work of the division, the note-books being placed at the disposal of the force, and a similar system has been kept up for the division. The accessions in the way of specimens are annually quite large, as many specimens are received which have no particular economic bearing, or whose habits do not in any way interest the farming community. These are, nevertheless, preserved, as every year some new injurious insects manifest themselves, and the species at one time supposed to have no economic interest may subsequently prove of such interest. Since the completion of the National Museum building it has been the aim of the Entomologist to co-operate with Professor Baird in building up a national collection of insects (he having donated his own private collections for that purpose), realizing that on account of the ease with which reference is made to them in said National Museum, and on account of the greater security and convenience which the building affords, it is eminently advisable to thus co-operate. Both the collections in the divisional rooms and those in the Museum are constantly in use in the preparation of reports and in the correspondence of the division.

Results in class 4, field-work and experiments, during the specified periods.—The work under this class is done almost entirely by so-called field agents, though some of it is also done by the office force at Washington. The number of entomologists so employed varies from time to time according to the season of the year, the work to be done, and the condition of the appropriations.

The number of such agents on the rolls from January 1, 1884, to January 1, 1885, was 7. One in New York, 1 in Rhode Island, 1 in Nebraska, 1 in Indiana, 2 in Florida, and 1 in Missouri.

During the year from January 1, 1885, to January 1, 1886, there were at one time or another upon the rolls of the division 13 such agents. Several of these were employed temporarily for certain definite investigations, and others were upon the roll throughout the whole year. Of these 13 1 was stationed in Connecticut, 1 in Iowa, 2 in Missouri, 2 in California, 1 in Illinois, 1 Pennsylvania, 1 in Florida, 1 in Rhode Island, 1 in Indiana, and 1 in Nebraska.

During the year from January 1, 1886, to January 1, 1887, there have been 12 such agents at one time or another. Of these the Iowa, Indiana, Nebraska, Illinois, Missouri, California, and Rhode Island agents were the same as the previous year, and a new agent was appointed in Florida and 1 in Ohio. One for three months only was sent from New York to Mississippi to work upon a special subject.

The work of the agent in Illinois is confined entirely to the subject of apiculture. His work is purely experimental and aims entirely at improvements in methods of bee-keeping; introduction of improved races; the improvement by cross-breeding of races already cultivated; the study of imported forage plants; the investigation of diseases, and the supposed injuries done by bees to fruit. The agent in charge of this work was appointed in May, 1885, and has submitted two reports showing satisfactory progress in his work.

Results in class 5, preparation of reports, etc., during the specified periods.—In the year from January 1, 1884, to January 1, 1885, there were published by the division the following documents: Bulletin No. 4; pp., 101; text figures, 4. Third Report of the United States Entomological Commission; pp., 454; plates, LXIV; maps, 3. Bulletin No. 1 (3d edition); pp., 37; text figures, 8.

In the year from January 1, 1885, to January 1, 1886, there were published: Bulletin No. 5; pp., 47. Bulletin No. 6; pp., 18; text figures, 1; plates, I. Special Miscellaneous Report No. 8; pp., 79. Report of the Entomologist for 1884; pp., 134; plates, X. Bulletin No. 8; pp., 46; text figures, 8. Special Report No. 11 (5th edition); pp., 37; text figures, 8. Fourth Report of the United States Entomological Commission; pp., 583; text figures, 45; plates, LXIV; maps, 2.

In the year from January 1, 1866, to January 1, 1887, there were published: Bulletin No. 11; pp., 34. Report on Insects affecting the Orange; pp., 237; text figures, 95; plates, XIV. Bulletin No. 12; pp., 46; plates, I. Bulletin No. 9; pp., 65; text figures, 29; plates, II. Report of the Entomologist for 1885; pp., 154; plates, IX; maps, 1.

In the interval from January 1, 1887, to March 1, 1887, nothing was actually published, but the manuscript of the following publications was in the hands of the printer at the latter date, and at the present time the documents mentioned are going through the press: Bulletin No. 10, pp., 68; text figures, 27; plates, I. Bulletin No. 13, pp., 70; text figures, 4. Annual Report of the Entomologist for 1886; pp., about 115; plates, XI; text figures, 1.

The work of the division can best be appreciated by its published results, as after all the value of work done is proportioned to the manner in which it is placed upon record and made available to the public, although there is of necessity a great amount of work that is not accounted for in print. In the matter of published and contemplated reports and bulletins, however, the following list of titles supplementing the above numerical list will represent the activity of the division fairly well, all of the documents representing results of original research and experiment:

Publications of the division of Entomology during the fiscal year 1886.—1. Bulletin No. 6. The Imported Elm-leaf Beetle. Its habits and natural history, and means of counteracting its injuries, pp., 18.

2. Bulletin No. 8. The Periodical Cicada. An account of Cicada septendecim and its tredecim race, with a chronology of all broods known, pp., 46.

3. Bulletin No. 11. Reports of experiments with various insecticide substances, chiefly upon insects affecting garden crops, pp., 34.

4. Bulletin No. 8. Second edition.

5. Insects affecting the orange. Report on the insects affecting the culture of the orange and other plants of the citrus family with practical suggestions for their control or extermination, pp., 227; figs., 95; plates, 14.

7. Fourth report of the U. S. Entomological Commission, being a revised edition of Bulletin No. 3, and the final report on the cotton worm, together with a chapter on the boll worm; pp., 546; figs., 45; plates, 64.

7. Report of the Entomologist for the year 1885; pp., 154; plates, 9.

8. Bulletin No. 12. Miscellaneous notes on the work of the division of Entomology for the season of 1885; pp., 45; plates, 1.

9. Bulletin No. 9. The mulberry silk-worm, being a manual of instructions in silk-culture. Sixth, revised edition; pp., 62; figs., 29.

PUBLICATIONS NOW IN PREPARATION.

1. Final report on insects injurious to forest trees (nearly completed).

2. Bibliography of Economic Entomology. A critical list of the economic writings of American entomologists.

3. Report on insects affecting domestic animals.

4. Report on remedies. A critical and classificatory treatise upon all remedies which have been recommended against injurious insects.

5. Report on insects affecting the garden crops of Florida.

6. Report on insects affecting the hop crop.

7. Report on insects affecting the cranberry crop.

8. Report on the periodical cicada.

9. Monograph of the Acrididæ. (Destructive grasshoppers.)

10. Bulletin on Acronyctas. (Destructive tree-caterpillars.)

11. Monograph of the cut-worms.

12. Reports on the insectivorous habits of birds.

THE OFFICE FORCE DURING THE PERIODS MENTIONED.

The office force of the division during the year from January 1, 1884, to January 1, 1885, consisted of twelve, including the entomologist and the assistant entomologist, whose positions were fixed by law. Of the others, four were assistants who were employed throughout the year; one was an artist who was employed throughout the entire year; one was a clerk who was employed throughout the entire year; one was an entomologist who was employed from April to December; one was an artist

who was employed for one month, viz, April; one was a messenger who was employed from June to December; and one was a clerk who was employed from September to December.

During the year from January 1, 1885, to January 1, 1886, three of the four assistant entomologists above mentioned were employed throughout the year. The fourth resigned the 1st of September. The assistant entomologist who was appointed in April, 1884, was transferred to field duty. Another assistant entomologist was appointed August 1, 1885, and continued throughout the year. The clerk of the year before was continued throughout the year and a second clerk was appointed March 1, 1885, and continued throughout the year. During May and June extra clerks were employed; one was for two months and two for ten days each.

During the year January 1, 1886, to January 1, 1887, the force consisted of the entomologist, his first assistant, and four other assistants, two clerks, and a messenger.

During the first three months of 1887 the force remained the same with the exception of one of the assistants who was discharged because of reduced appropriation, on January 1, 1887.

ATTENDANCE TO DUTY.

The force during the time mentioned has averaged two hundred and seventy-five working days to the year. In no case has the annual leave of thirty days been exceeded and there has been no case of prolonged sickness. No substitutes have ever been employed. Up to 1884 the entomologist individually took no annual leave, but in 1886 his health failed and he was given a sick leave for three months.

DUTIES OF EMPLOYÉS.—COMPARISON OF THE AMOUNT OF WORK IMPOSSIBLE.

There is no way in which the work of one employé of the division can very well be compared in amount with the work of another. The office and field forces are so systematized that each one has some special work to do which differs more or less in character from that of any other. For instance, the force of the division at present writing is composed of the entomologist and four entomological assistants, two clerks, one artist, and one messenger; while the field force is composed of six special agents situated in different parts of the country where the insect fauna varies and each engaged in some separate and independent investigation. Of the office force the duties of the entomologist are, as a matter of course, those of supervision and general management and administration, the writing of the report, the planning of work, and the arranging of the duties of the others. The four assistant entomologists are each specialists in some one branch of the science of entomology. Two of them are engaged primarily in the care of the insects in vivaria and in mounting and arranging specimens for the permanent collections. One of these is also engaged in the examination of the insect stomach contents of birds submitted by the division of ornithology and mammalogy. A third assistant entomologist is at present engaged in collecting data concerning the injuries of a particular class of injurious insects, with a view to the publication of an extended report upon the subject. The first assistant's duties are to take care of a certain portion of the correspondence of the division and to assist in the preparation and editing of the reports, and to assume charge in the absence of the entomologist. Of the two clerks, one is a short-hand writer and type-writer. To her the bulk of the correspondence is dictated, and she also acts as a copyist. The second clerk has charge of the letter files and of the copying of letters, of copying the extensive entomological notes of the office, and she also reads through the newspaper exchanges of the division, and clips and files the items of entomological interest.

AN INSTANCE OF THE METHODS OF WORK.

As an instance of the methods in force we may take a receipt of a package of injurious insects received by the Commissioner of Agriculture from a distant part of the country, accompanied by a letter giving an account of the damage which is being done by them. The letter and the package are referred to the division. The entomologist or the first assistant reads the letter and examines the specimens or hands the package to one of the assistants, who opens it, and if the insects be living places them in a breeding-cage with a supply of their proper food. The chances are that the insect is one which has previously been received and is well known, and has moreover been treated in one of the publications of the division. In such event the entomologist or his first assistant, if the facts are well remembered, first suggests the reply to one of the other assistants who is best competent to write the reply from his special knowledge of the order of insects to which the specimens may belong. If the reply requires something special, or is beyond the knowledge of any of the assistants, a reply is at once dictated to the stenographer. If the past history of the species, as recorded in the notes, is not fully remembered, the specimens are referred to the assist-

ant in charge of the note-books, who, by means of an index or by virtue of his better recollection of his special work, ascertains the number under which previous notes have been made, and under which are entered all of the details of the life history of the species, and all of the facts as to its previous occurrence and of previous sendings to the Department. The assistant then attaches the number and the name of the insect to the letter, which is then returned to the entomologist, who dictates an answer to one of the clerks, giving an account of the insect and suggesting remedies, if any are known, and referring the correspondent to some of the publications of the Department in which the insect has been treated, or perhaps transmitting at the same time one of the bulletins of the division containing the article referred to.

If, however, as frequently happens, the insect is new in the rôle of a pest (and insects formerly rare are constantly becoming pests), it is always referred to the entomologist in charge for opinion, and a new number is made in the note-books, the insect is carefully studied, and, if the damage is sufficiently great to warrant the expenditure of so much time and money, one of the field agents or one of the assistant entomologists is dispatched to the place of injury and directed to study the outbreak in the field, learning as much as possible of the habits, collecting abundant material for the study of the life history at the Department, and experimenting with remedies suggested by the entomologist. The letter written in reply to such a letter of inquiry is sent to the Commissioner of Agriculture for signature, and is then returned to the division of entomology and copied in its books before being mailed.

SECTION OF SILK-CULTURE.

The division has always done all that it could to aid silk-culture by the dissemination of eggs and correct information to applicants in all parts of the country. The growing interest from year to year manifested in this industry caused a continually increasing correspondence and labor. This interest culminated in 1884 by the substantial encouragement which the State of California gave through its State legislature, and the activity of the Women's Silk-Culture Association of Philadelphia. A special appropriation of \$15,000 was given to the Department, in the appropriations for 1884-'85, for the encouragement of the industry.

During the first half of 1884, therefore, the work in silk-culture was carried on by the general divisional force; but from July 1, 1884, on account of the increased work demanded by Congress, a special section of silk-culture was established.

During the periods from July 1, 1884, to July 1, 1886, the work took the form of endeavoring to establish filatures and home markets at three different points, viz, San Francisco, New Orleans, and Philadelphia, and the work and correspondence of the section connected with these efforts took quite all of the time of an assistant and much of that of the chief.

From the 1st of July, 1886, to the present time, however, the stations outside have been abandoned and the experimentation has been confined to filature work on the Department grounds, and particularly to testing the Serrell automatic reel. The correspondence has not lessened, but the assistant has had to devote a large share of his time and of the force of the section to the filature work.

During the calendar year 1885 in the neighborhood of 4,000 letters were received in this branch of the division, while 3,000 were attended to during the calendar year 1886, and 391 letters during the year 1887, up to the 1st of March. A very large proportion of this correspondence was in the nature of applications for the articles currently distributed by the Department, such as manuals of instruction in silk-culture and silk-worm eggs. Of the remainder, a large proportion, too, were in the nature of requests for information with regard to silk-culture, which could have been replied to by any one well informed in the industry without entailing any special research. The most troublesome correspondence, and that occupying more of the time of the chief and assistant than all the rest, were the letters received from and sent to the agents of the office in charge of the experimental stations at Philadelphia, New Orleans, and San Francisco.

It has been the object, owing to the small number of clerks attached to this section, to so combine the efforts of all as to have the necessary work performed in the manner best calculated to benefit the service. There exists, therefore, no record of the individual labor of the clerks from time to time attached to the force. The general character of the work performed by the different employés attached to the office since its institution is as follows:

One clerk was appointed November 1, 1884, and transferred on February 28, 1885. He assisted generally in the correspondence and general work of the office, which was then less systematized than at present.

One was appointed in March, 1885, and still retains her position. Her duties have been to conduct the correspondence of the section and perform miscellaneous services as a type-writer. At present she is the only clerk on the force, and conducts all the clerical business.

A third employé served for a short time in the spring of 1885, performing certain manual labor in connection with the distribution of silk-worm eggs.

A fourth was appointed in June, 1885, and transferred on February 1, 1887. Her duties were to keep the records of the office and make certain necessary translations from the French.

A fifth was employed from August, 1885, to September 15, 1886, in the preparation and care of silk-worm eggs and their microscopical examination for the detection of disease.

An expert was, on October 1, 1886, placed in charge of the experimental silk filature, and has since had the supervision of the details of the operation of that establishment, and another expert was appointed at the same time to act as forewoman.

In addition to the above-named persons, are five operatives and one laborer employed in the filature, and certain special laborers and mechanics have been from time to time employed for short periods to do miscellaneous work found necessary. No proxies have ever been employed.

The method of conducting the correspondence appears in the following statement :

Any letter, as soon as it is received, is first stamped with the date of the receipt and a serial number (see Exhibit 1). It is then jacketed (Exhibit 2), and the serial number entered upon an index card (Exhibit 3), bearing the name and address of the writer. This card is filed in an appropriate cabinet, which thus contains a list of all the correspondents of the office; and furnishes a means of ready reference to all communications received from the writer. The greater portion of the correspondence is of a routine nature, and as far as possible circulars have been prepared for use in replying to such questions as are of most frequent occurrence. As soon as a letter is jacketed the correspondence clerk replies to such portions of it as may be answered by existing circulars, and indorses the date of mailing such circulars on the jacket. Should application be made for any articles outside of the jurisdiction of the office, such, for instance, as seeds or documents, it is referred to the chief clerk upon a proper form (Exhibit 4). The most frequent requests are for books of instruction on silk-culture, silk-worm eggs, and information with regard to market for cocoons.

The first is replied to by a pamphlet (Exhibit 5), accompanied with a circular letter of transmittal (Exhibit 6). In answer to the second a suitable circular letter (Exhibit 7) is sent, and this is accompanied with a form for making formal application for eggs (Exhibit 8), upon which the applicant makes an inventory of the quantity and variety of silk-worm food at his disposal, and, in certain cases, a report upon his experience in raising silk-worms. There is also sent to him a return penalty card (Exhibit 9) with which to inform the Department when his food-plants are in such a state of development as to enable him to begin the feeding of his worms. This is made necessary by the fact that most of the applications are made late in the winter, while it would not be possible to raise the worms until some weeks later, and it is inadvisable, for certain technical reasons, that the eggs should be sent from this office until the time for rearing has arrived. When the return penalty card is received back, a suitable quantity of eggs is sent to the applicant, together with an appropriate letter of transmittal (Exhibit 10).

In regard to the third question, *i. e.*, a market for cocoons, it has been customary to reply to it by the circular of July 9 (Exhibit 11), stating the terms upon which cocoons will be purchased by the Department. The first step of the seller has usually been to send a sample of the cocoons offered for sale, which sample, as soon as received, is referred to the director of the filature. He reports upon its quality and value upon a proper form (Exhibit 12), and his quotation is transmitted by circular letter (Exhibit 13) to the would-be seller. The terms being satisfactory, the cocoons are duly shipped, and upon their receipt their weight and value are reported to this office by the director of the filature. (See Exhibit 14 for form). This report is referred to the correspondence clerk, who fills out suitable bill blanks (Exhibit 15), in duplicate, and forwards them to the seller with a formal letter of transmittal (Exhibit 16). When the bills are again received in this office, the necessity of the purchase which they cover is certified to, and they are then referred to the disbursing office for subsequent action. If the Department should not at the time be purchasing cocoons the person offering them is so informed (Exhibit 17).

In 1885 silk-worm eggs were purchased of American raisers, and certain forms (Exhibits 18, 19, 20, and 21) analogous to those used in purchase of cocoons were sent.

It has, too, been found convenient to issue certain special circulars to meet certain peculiar conditions, such as an inability to supply manuals of instruction (Exhibits 22 and 23), or a cessation of the distribution (Exhibit 24) or purchase (Exhibit 25) of silk-worm eggs.

SECTION OF ECONOMIC ORNITHOLOGY.

The work of this division touches intimately on various other branches of zoology, but on none more than on ornithology. Few injurious insects can be well and fully considered without reference to their liability to be devoured by various natural ene-

mies, and especially birds. The interrelation between birds and insects is a theme which necessarily interests any one who fully appreciates all the bearings of applied entomology.

In the spring of 1885, Congress added \$5,000 to the appropriation of the division, for the promotion of economic ornithology, and charged the entomologist with carrying on the work. A distinct section was established and work was begun by the appointment of a special agent in charge, with an assistant and a clerk.

Early in June, 1885, a circular was prepared setting forth the objects of the investigation, and asking information concerning the food-habits of certain well-known birds which were supposed to be beneficial or injurious to the farmer. About 2,000 copies of this circular were distributed to farmers and ornithologists throughout the country, and a large number of replies were received. During the winter two additional circulars, accompanied with three schedules were prepared, which related to the migration and geographical distribution of North American birds. These were sent to the keepers of light-houses along the coasts and lakes and to the regular observers of the American Ornithologists' Union.

Special attention was given during the year to the English sparrow question, and a large amount of information has been collected. The ravages of birds in the rice fields of the South was another matter which early received attention, and an agent was sent on an extended tour through the rice-growing districts, giving particular attention to those of Georgia and Louisiana. The formation of a collection of the stomachs, crops, and gizzards of birds was early undertaken, and has been continued to the present time.

In 1886 a special division of economic ornithology and mammalogy was created by Congress, and its organization and methods of conducting business since that time will appear elsewhere; it has been arranged, however, that the entomological division should take charge of the question of food-habits so far as they relate to insects, and in this direction a number of stomach contents have been turned over by the ornithologist and have already been studied and work will continue.

7837.

BOX 144, SAN MARCOS, HAYS COUNTY, TEX.

SIR: I am not sure, but suppose you are the person to whom I am to apply for silk-worm eggs. If not too late for this year's distribution, I should feel deeply obliged by your sending me a few as I have long wished to test their success in Texas. The climate and circumstances seem to me particularly adapted to silk culture. Our mulberries are coming into leaf; we can also obtain the bois d'arc if more suitable. I should like very much to obtain some small paper on the subject of feeding the worms; whether to put them on the trees and gather the cocoons, or gather the leaves and feed the worms in the house.

Your obedient servant,

(Signed) LUCY WILSON.

C. V. RILEY, Esq.,
Entomologist.

[Indorsement on envelope:]

1887.]

[No. 7837.]

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY (SILK-CULTURE).

From Lucy Wilson,
*Box 144, San Marcos,
Hays County, Tex.*

Date ———, ———, 188—.
Received, April 7, 1887

SUMMARY OF CONTENTS.

Application for silk-worm eggs, and manual of instructions on silk-culture, etc.

ANSWERED.

April 7, 1887, by circular No. 1.
April 7, 1887, by circular No. 12.

REMARKS.

Wilson, M. Lucy,
Box 144,
(P. O.) San Marcos,
Hays County,
State, Texas.

Communications received.	Communications sent.			
	Record.	Page.	Record.	Page.
7837				

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY (SILK-CULTURE).
Washington, D. C., ———, 1886.

The following applications for ——— are respectfully referred to the chief clerk.

PHILIP WALKER,
Special Agent.

U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., ———, 188—.

——— :

In conformity with your request I have to-day caused to be mailed to you a copy of the pamphlet on "The Mulberry Silk-worm," by Prof. C. V. Riley, United States Entomologist.

Yours, respectfully,

NORMAN J. COLMAN,
Commissioner of Agriculture.

U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., ———, 188—.

——— :

In reply to your letter asking for silk-worm eggs, I beg to inclose a blank upon which you should make out a formal application. If, on the receipt of this, properly filled out, I find that you prefer to winter your own eggs I will have them sent to you during the month of December. If, on the contrary, you wish to have them kept in Washington, I will have them carefully hibernated, sending them to you in the spring when you inform me that the foliage in your neighborhood is ready to furnish food for the worms. I send you a card upon which you may give me this information. It should be dated and signed by you before mailing.

Yours respectfully,

NORMAN J. COLMAN,
Commissioner.

Issue number, ———.

Application number, ———.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY.

APPLICATION FOR SILK-WORM EGGS.

Name of applicant, ——— (if female, state if Miss or Mrs.); street or P. O. box, if necessary, ———; post-office, ———, ——— County, State, ———.

(Write the name and address very legibly, and if you have them in print, please inclose them.)

(Please fill out the following blank to indicate the kind of silk-worm food that you propose to use and the quantity that you have at your disposal.)

MULBERRY (number and size or age of trees).

White (*Morus alba*), _____

Japonica, _____.

rosea, _____.

multicaulis, _____.

Morettiana, _____.

Black (*Morus nigra*), _____.

Russian (*M. tartarica*), _____.

(The paper mulberry (*Broussonetia papyrifera*) is not suitable for silk-worm food.)

Osage orange. State length of hedge, _____.

Do you wish to keep your own eggs during the winter? If you have no preferences, it is considered better for applicants east of the Rocky Mountains to have the eggs wintered here, where a hibernating box of special construction has been prepared for that purpose. They can be sent out in the spring when the foliage is in condition to furnish food for the worms. Answer.

How many seasons' experience have you had in silk culture? _____.

If you have not already done so, will you please report to the Department, on the other side of this sheet, on the details of that experience.

APPLICANT'S REPORT OF EXPERIENCE IN SILK-CULTURE.

(Written on margin of blank:)

Do not write beyond this line.

U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., _____, 188-.

_____:

Your formal application for silk-worm eggs has been received and I have to-day caused to be sent to you 1 ounce of eggs of a yellow annual race. This is the only race that will be distributed by the Department this season, and it will not be advisable to mix it with races obtained from any other source. These sent you are of the variety called _____. These eggs have been carefully produced and submitted to the Pasteur system of selection, which insures their freedom from pebrine. You will confer a favor by submitting a report at the end of the season as to your experience, stating especially the proportion of the eggs that hatch, the kind of food used, and the product (in pounds avoirdupois) of fresh cocoons. The cocoons should be weighed as soon as the floss has been removed, for they lose rapidly in weight from the evaporation of the water which they contain, and the result obtained after partial drying would be misleading.

Directions for the care of eggs and of the worms after hatching will be found in the pamphlet on "The Mulberry Silk Worm" by Prof. C. V. Riley, U. S. Entomologist, which may be had upon application to this department.

Very respectfully,

NORMAN J. COLMAN,
Commissioner of Agriculture.

U. S. DEPARTMENT OF AGRICULTURE.

By a recently enacted law I am instructed to conduct "at some point in the District of Columbia, experiments with automatic machinery for reeling silk from the cocoon." To enable me to prosecute these experiments I shall purchase a few thousand pounds of dry cocoons upon the following conditions:

No samples should be sent in before September 1, 1886, and no cocoons will be purchased before October 1.

The highest price that will be paid will not exceed \$1.15 per pound, and this will be given for such cocoons only as will produce 1 pound of silk from 4 pounds of raw material. For inferior cocoons such prices will be paid as their quality will justify, and it must be remembered that very poor cocoons can not be reeled and are only salable as waste and as such bring excessively low prices. In the present state of the industry in this country but few raisers produce cocoons of such quality as will command the maximum price quoted.

Persons having cocoons to sell should notify this office before shipment so that they may be informed whether or not the full quantity required has been purchased.

This may be done upon the inclosed official postal card. No cocoons will be purchased except by previous agreement, and lots shipped without regard to these instructions will not be returned to the shipper at the expense of this Department. It would be wise to send with the notification a small sample of cocoons, which may be mailed without payment of postage if the inclosed franking label be used. Upon receipt of such a sample the shipper will be informed, approximately, of the price which will be paid for the cocoons. But as it is extremely difficult to judge of the value of the whole lot by the inspection of a small sample I can not undertake to bind myself by the estimate thus given. Lots of cocoons weighing not more than 4 pounds may be sent by mail with one of the inclosed slips attached.

In shipping samples or lots of cocoons it is very important that the name and the address of the shipper should be placed both inside and on the outside of each parcel or box. All freight and express charges must be prepaid by the shipper.

In order to save transportation expenses it is suggested that neighbors combine their small lots in one case and ship them by freight. The lots should, however, be separately packed in the case and each labeled with the name and address of its owner.

No special instructions are needed as to the packing of cocoons for shipment beyond calling attention to the fact that crushing must be guarded against. No soft or foul cocoons should be placed in the case.

NORMAN J. COLMAN,
Commissioner of Agriculture.

WASHINGTON, D. C., July 9, 1886.

Some loss of cocoons, shipped by mail, has been caused by depredations of mice that have gnawed through the pasteboard boxes in which samples were inclosed. The use of tin or wooden boxes for shipment of such samples is therefore advised.

(A slip attached to the circular is indorsed :)

RETURN PENALTY SLIP.

U. S. DEPARTMENT OF AGRICULTURE.

This slip may only be used for reply to official communications. The address must not be changed.

OFFICIAL BUSINESS.

ANY PERSON using this slip to avoid the payment of postage on private matter will be subject to a fine of THREE HUNDRED DOLLARS.

To

Hon. NORMAN J. COLMAN,

U. S. Commissioner of Agriculture,

COCOONS.

WASHINGTON, D. C.

SAMPLES OF COCOONS.

Record of receipts for ———, 188—.

Sample No.	Name.	Letter No.	Weight offered.		Report.		
					Quality.	Price offered.	
			Pounds.	Ounces.		Per pound.	Total.
						\$	\$

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., ———, ———.

Permit me to acknowledge the receipt of your late communication with its accompanying samples of cocoons. In reply I beg to say that the sample has been examined and that the lot from which it is taken is estimated to be worth \$—— per pound avoirdupois. If you conclude to ship the cocoons to this office, you will confer a favor by notifying me of the time and manner of shipment. The following quotations from the Commissioner's circular of July 9, 1886, will recall to you the conditions upon which we purchase cocoons:

"Upon receipt of a sample the shipper will be informed, approximately, of the price which will be paid for his cocoons. But as it is extremely difficult to judge of the value of the whole lot by the inspection of a small sample I can not undertake to bind myself by the estimate thus given.

"Lots of cocoons weighing not more than four pounds may be sent by mail with one of the inclosed slips attached. In shipping samples or lots of cocoons it is very important that the name and address of the shipper should be placed both inside and on the outside of each parcel or box. All freight and express charges must be prepaid by the shipper.

"No special instructions are needed as to the packing of cocoons for shipment beyond calling attention to the fact that crushing must be guarded against. No soft or foul cocoons should be placed in the case."

Yours respectfully,

_____,
Special Agent.

Remarks :

LOTS OF COCOONS.

Record of receipts for ——— ———, 188—.

Lot No.	Name.	Sample No.	Letter No.	Weight of lot, pounds and ounces.	Price to be paid.		Dates.	
					Per pound.	Lot.	Receipts forwarded.	Bills approved.

UNITED STATES DEPARTMENT OF AGRICULTURE TO ——— ———, DR.

188—.	For pounds cocoons, at \$.....		
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Received, at Washington, D. C., the ——— day of ———, 188—, of Norman J. Colman, Commissioner of Agriculture, ——— ———, payment in full, having signed duplicate receipts.

_____,
(Sign here, in ink, exactly as your name is entered at the top.)

DIVISION OF ENTOMOLOGY, ——— ———, 188—.

These cocoons were necessary to the legitimate work of this division, performed in pursuance of the act approved June 30, 1886, for "conducting, at some point in the District of Columbia, experiments with automatic machinery for reeling silk from the cocoon."

_____,
Special Agent.

[Indorsed on back:] No. ———; \$——

I certify that the articles enumerated within have been received and legitimately applied; and that the price is just and reasonable.

_____,
Entomologist.

Approved:

_____,
Commissioner of Agriculture.

SILK CULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., ———.

Permit me to acknowledge the receipt of your recent communication with its accompanying shipment of cocoons. The chief of the silk division reports that the cocoons have been weighed and that their weight and value per pound are as follows:

Lot.	Weight of lot. Pounds.	Value per pound. \$	Value of lot. \$
------	---------------------------	------------------------	---------------------

I inclose herewith duplicate vouchers for your signature. As soon as they are returned to me properly signed I will have a check for the amount due mailed to you at once.

Yours, respectfully,

NORMAN J. COLMAN,
Commissioner.

U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., ———, 188—.

_____:

In reply to your recent letter I beg to say that I have now purchased all the cocoons which I can conveniently use before April 1, and that no more will be received for the present.

Your offer has been placed on file, and as soon as I am ready to make further purchases you will be notified.

Yours, respectfully,

NORMAN J. COLMAN,
Commissioner of Agriculture.

[Circular No. 9.]

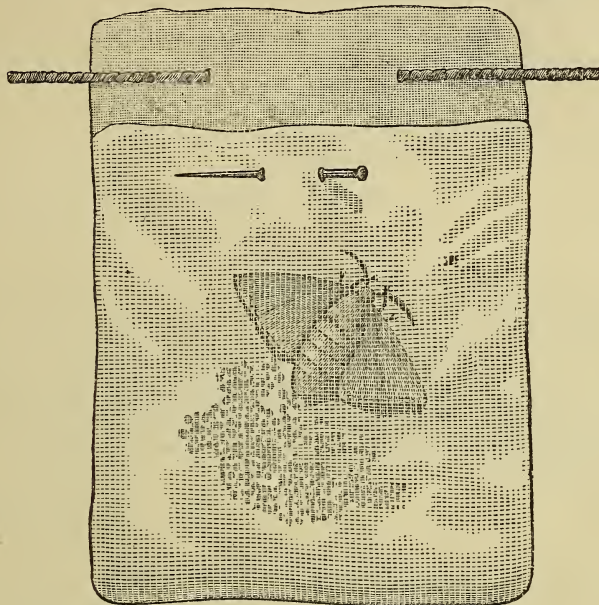
U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., May 1, 1885.

The Department of Agriculture will purchase during the coming summer such quantities of silk-worm eggs as may be deemed necessary for the distribution that it is proposed to make for the season of 1886. So far as found practicable the eggs will be purchased of American producers. There are certain precautions, however, that must be taken to insure purchase. Eggs of improved races only (preferably of the French or Italian yellow races) will be bought, and the producer should send one or two samples of pierced cocoons with the eggs. In addition to this the producer must conform to certain rules to be hereafter explained, so that an examination may be made that will serve to show the degree of purity of the eggs. No silk culturist should use his crop for the production of eggs unless the worms have shown, until they began the spinning of their cocoons, every sign of perfect, robust health. Any indication of the disease called *flacherie*, from which the worms so often die after the fourth molt and turn black from putrefaction, or of any other disease from which silk-worms suffer, should be considered as ample reason for not using the cocoons for the purpose in question. They should, on the other hand, be sold for the filature. If the worms have all the indications of health until the spinning period, then the cocoons may be used for the production of eggs. The following brief instructions will prove of service to those who wish to secure sound eggs:

For each ounce of eggs to be produced, about three-quarters of a pound of fresh cocoons from the finest and firmest in the lot should be chosen. These should be

strung in sets upon a thread, care being taken not to pierce the chrysalis, and the strings hung in a cool, darkened room. The moths generally emerge from the cocoons early in the morning and will be seen crawling about over these, the males being noticeable by their smaller abdomens, more robust antennæ, and by their greater activity. The moths should be placed, regardless of sex, on a table, where they will soon find their mates and couple. As soon as formed the couples should be removed to another table that they may not be disturbed by the flutterings of the single moths.

There should be prepared for each ounce of eggs to be produced about 100 small



bags of fine muslin, made in the following manner: Cut the cloth in pieces 3 by 6 inches; then fold one and over so as to leave a single edge of about three-quarters of an inch, as shown in the accompanying cut. This should be sewn up into a bag with the upper end open and then turned inside out, so that the seams will cause the sides to bulge. Thus completed, they are called "cells." The cells should be strung on a cord stretched across the room.

The moths couple as a rule about 8 o'clock in the morning. About 4 in the afternoon they should be separated by taking them by the wings and drawing them gently apart. Each female should now be placed by herself in a cell, which is then closed by a pin as shown in the figure. Here she will lay her eggs and in due time die. The males may, as a rule, be thrown away, but it is wise to keep a few of the more active ones in case there should be a superabundance of females the following day.

When the females have finished laying their eggs, which operation occupies about thirty-six hours, they are ready to be shipped to this office. The cells, with their inclosed moths and eggs, should be placed in a strong box of wood or tin, being packed in such a manner that they will not be crushed, and mailed to the entomologist at this Department. By using the inclosed return penalty slip payment of postage may be avoided. The name of the sender should be placed in each box. The moths, as soon as received, will be examined microscopically, and the eggs of those which are found to be free from disease will be weighed and paid for at the rate of \$2.50 per ounce of 25 grams (about six-sevenths of an ounce avoirdupois). Silk culturists are advised not to attempt the production of eggs unless they are adepts at the industry and have had at least one season's experience. We would advise each person desiring to sell to send a sample first with a statement of the quantity offered.

C. V. RILEY,
Entomologist.

(Circular No. 14.)

DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., ———, 1885.

I have to-day received from you ——— silk-worm moths accompanied by the eggs which they have laid, put up in conformity with my circular No. 9. Of this number the eggs of ——— moths appear to be unimpregnated and therefore worthless. The remaining ——— moths will be critically examined and the eggs of those found to be unaffected with disease will be purchased at the rate indicated in circular No. 9 (\$2.50 per ounce). As this examination must be made in connection with that of the stock of other persons, it may be some little time before you will again hear from me.

Yours, respectfully,

C. V. RILEY,
Entomologist.

(Circular No. 15.)

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., ———, 188—.

Confirming my circular letter No. 14, I now beg to inform you that after examination, I find that, of the lot of ——— moths, with apparently pure eggs acknowledged in that circular, ——— have been found to be free from disease. There are ——— ounces of sound eggs from these moths, which, at the price offered (\$2.50 per ounce), are worth \$———. I inclose herewith two receipts, which should be signed by you in ink, on the dotted line at the bottom, in the same manner as your name is filled in at the top. You should then remail them in the inclosed envelope. As soon as these receipts shall have been received by me, the disbursing officer of the Department will remit to you the amount due on the eggs.

Yours, respectfully,

C. V. RILEY,
Entomologist.

DEPARTMENT OF AGRICULTURE.

To ———, Dr.

1885.			
.....	For ——— ounces of silk-worm eggs, at \$2.50 per ounce.....	\$.....	.....

Received at Washington, D. C., the ——— day of ———, 1885, of Norman J. Colman, Commissioner of Agriculture, ——— payment in full, having signed duplicate receipts.

(Sign here, in ink, exactly as your name is entered at the top.)

No. ———, \$———.

I certify that the articles enumerated within have been received and legitimately applied, and that the price is just and reasonable.

———,
Entomologist.

Approved:

———,
Commissioner of Agriculture.

SILK CULTURE.

(Circular No. 13.)

DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., ———, 188—.

I have to-day received your request for a copy of my manual on the silk-worm, which is published as Special Report No. 11, of this Department. I regret to say that this cannot be sent at once, as the fifth edition has been exhausted. I am, however,

preparing a sixth and enlarged edition, of which I will send you a copy as soon as it is published.

Yours, respectfully,

C. V. RILEY,
Entomologist.

(Circular No. 19.)

DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., ———, 188—.

Referring to a circular letter from this office, under date of ———, 1885, informing you that as soon as issued I would send you a copy of the sixth edition of Special Report No. 11, I now beg to say that it has been found impossible, owing to the pressure of work in the office, to prepare this revised edition, with the care which it requires, in time for distribution this summer, and I have therefore had the last edition reprinted. Of this reprint I now send you a copy that you may not be required to wait longer for the information that you seek.

Yours, respectfully,

C. V. RILEY,
Entomologist.

(Circular No. 17.)

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., ———, 1886.

Permit me to acknowledge the receipt of your letter applying for silk-worm eggs, and to inform you that there will be no more distributed until the coming winter. Before that time I will have sent to you proper blanks to enable you to make a formal application.

Yours, respectfully,

C. V. RILEY,
Entomologist.

[Circular No. 21.]

DEPARTMENT OF AGRICULTURE,
DIVISION OF ENTOMOLOGY,
Washington, D. C., ———, 188—.

In reply to your inquiry of ———, permit me to say that I have purchased, or made agreements to purchase, all the silk-worm eggs that I shall require for the distribution of 1886.

Yours, respectfully,

C. V. RILEY,
Entomologist.

Issue No. ———.

DEAR SIR: As the foliage in this neighborhood is now sufficiently advanced to begin the feeding of silk-worms, you will confer a favor by sending me my eggs as soon as possible.

Yours, respectfully,

[Indorsed.]

RETURN PENALTY CARD.

U. S. DEPARTMENT OF AGRICULTURE.
OFFICIAL BUSINESS.

This card may only be used in reply to official communications. The address must not be changed.

ANY PERSON using this card to avoid the payment of postage on private matter of any kind will be subject to a fine of THREE HUNDRED DOLLARS.

To Hon. NORMAN J. COLMAN,

U. S. Commissioner of Agriculture,
Washington, D. C.

SILK-CULTURE.

UNITED STATES DEPARTMENT OF AGRICULTURE,
DIVISION OF CHEMISTRY.

In addition to the account of the work which follows, I will say, that from the 1st of January, 1884, to November 5, 1885, two helpers were employed in this division to assist the chemists in the preparation of apparatus, etc., necessary for their work. From July 2, 1886, to March 1, 1887, the work of the division had so increased that three such helpers were necessary.

From January 1, 1884, to March 1, 1887, there was employed in this division one clerk, who has had charge of all the correspondence of the division, the copying of all reports and bulletins preparatory to sending them to the Public Printing Office, and the care of all letters and documents and other clerical business belonging to the general work of the division.

During the time mentioned about half the force of the division has been employed in the investigations in the manufacture of sugar. At certain seasons of the year—namely, from the 1st of September to the 1st of January—the whole of the force of the division has been employed in this work.

The results of this work have been published as Bulletins Nos. 2, 3, 5, 6, 8, 11, and 14.

The average number of chemists employed in the division from January 1, 1884, to December 31, 1884, was 9.4 and 1 clerk.

The character of the work pending on the 1st of January, 1884, will be sufficiently indicated by the detailed statements herewith transmitted.

The minimum and maximum amount of business attended to by each one of the chemists employed in the division is fully set forth in the inclosed statement. The number of days devoted to the business of the Department by the division of chemistry is also set forth in the same document. In no case has the work of any one of the employes been performed by a proxy, nor has any one of them had more leave than that allowed under the law.

A statement of the method of transacting business in the division would require a full description of all the analytical operations carried on by the chemists. It does not seem possible in this connection to furnish such a treatise on analytical chemistry, and I do not suppose it is really desired.

On January 1, 1884, the division was engaged in an investigation of the composition and physical properties of American wheat and corn, the results of which appeared as Bulletin No. 4 of the division. The investigations involved a large number of analytical determinations, which consumed nearly the entire year for one chemist.

In addition, during the year 1884 the subject of corn ensilage as food for cattle was investigated, the results appearing in the Annual Report of the Department for 1884.

Numerous ores, marls, milks, waters, others, ciders, drugs, also were analyzed, and much other work of a miscellaneous character.

During the sugar season the work involved several months' time; also the preparation of the necessary reagents and apparatus, calculating and tabulating results, looking up references, writing out reports, proof-reading, purchasing samples, weighing precipitates, all of which consumed more or less time, which it would be difficult to tabulate.

During this year the following routine work was entered upon:

	No.		No.
Butter:		Milk:	
Specific gravity.....	61	Specific gravity.....	220
Salt.....	47	Specific gravity of the whey.....	91
Caseine.....	10	Ash.....	68
(Microscopic tests of all the samples analyzed; tabulating results and reading proof of report.)		Soils: Complete analyses, done mostly in duplicate, and some determinations in triplicate.....	32
Cereals:		(The work began in July and was not finished till August, 1885.)	
Phosphoric acid, including a similar number of determinations of ash.....	673	Sugar-beets:	
Crude fiber.....	219	Specific gravity.....	20

Of the miscellaneous work received during the year such determinations were made on the different samples as the nature of the case demanded, and the results obtained were sent by letter to the interested parties. The following number and variety of samples were reported and passed through the division:

Waters.....	13
Lots of minerals.....	69
Marls.....	19
Fertilizers.....	7
Blue dust.....	1

During the year the division also made the following analyses:

	No. samples examined.	No. deter- minations made.
Experiments with lime sucrates	36	36
Comparison of methods for estimation of lactose in milk and analysis of samples	108	264
Analyses of maple sugars and sirups	40	265
Analyses of butters, and investigation of methods of analysis	35	341
Analyses of sorghum-cane juices	104	293
Analyses of beet juices	67	70
Analyses of cane juices, sirups, sugars, and canes at Magnolia Station, La ..	377	754

The division also published a report on the experiments in the manufacture of sugar at Magnolia Station, Lawrence, La., incorporated in Bulletin No. 5.

This report is as accurate as possible, and shows all the work of which a record has been kept. It is impossible to state the amount of time expended in tabulating results and reading proof of reports.

The following samples were analyzed and determinations made:

	No.		No.
Analysis of sugar	6	Glucose and sucrose in sugar beets, grape juice, and fermentation experiments	70
Analysis of milk	25	Moisture in sirups	86
Cream determinations	114	Water and ash in miscellaneous samples ..	178
Experiments with caseine, etc.	144	Soils, nitrogen	73
Analysis of silver ore	1	Rye, albuminoids	61
Analysis of tin	1	Maple sugar, albuminoids	22
Analysis of fertilizers, complete ..	2	Fertilizer, nitrogen and ammonia	84
Examination of compound marl analysis ..	1	Flour, albuminoids	34
Copper ore	2	Corn, albuminoids	12
Examination of phosphoric acid	26	Honey, albuminoids	43
Potash experiments	30	Koumiss, albuminoids	20
Nitrogen combustions	2	Beets, albuminoids	76
Moisture determinations	2	Oats, albuminoids	310
Preparing for Louisiana work:			
Samples of milk, total solids, ash, fat ..	108	Ensilage, albuminoids	3
Analysis of wheat, fat, crude fiber	407	Asphalt, nitrogen and ammonia	6
Analysis of corn, fat, crude fiber	89	Milk, albuminoids	93
Analysis of flour and mill products, fat and crude fiber	97	Wheat, albuminoids	81
Complete analysis of wheat germs	1	Barley, albuminoids	90
Complete analysis of ensilage	16	Ship stuff, albuminoids	1
Bat guaño	5	Blood, nitrogen	2
Muck	3	Sugar-cane, albuminoids	191
Sample of root	1	Peat and cider, albuminoids	2
Sample of bark	1	Maple sap, albuminoids	73
Marl	4	Sorghum, albuminoids	133
Fertilizer	3	Whisky, albuminoids	16
Gnano	4	Corn, fodder, amides	2
Asphalt	2	Beets, albuminoids	19
Glucose in sorghum juices and produce ..	274	Clover and linseed cake, albuminoids	3
Glucose in sugar, molasses, and masse cuites from Louisiana	128	Moisture, ash, and gluten in the samples of rye, wheat, barley, and oats .....	...

The average number of chemists employed in this division from January 1, 1885, to December 31, 1885, was 9.3 and one clerk.

During the year 1885 the work done by this division included the following analyses:

	No.		No.
Soils: The work was continued from last year and published in Special Bulletin No. 10 of this division.		Lactose in milks	369
Samples of birch oil received from the State Department, and the report was published in their consular report on leather manufacture	2	Phosphoric acid, lime, etc., in fertilizers	49
Complete analyses of samples of ores from the State of Louisiana	12	Honey, total solids, ash	43
Honey, determinations of specific gravity	10	Samples of koumiss, fat, moisture, ash	8
Water, samples analyzed	11	Carbonic acid determinations in soils	20
Limestones, complete analyses	2	Samples of milk, fat, moisture, and ash	13
Teas, determinations	16	Samples of fertilizers	14
Miscellaneous minerals analyzed	46	Samples of muck	3
Marls	13	Samples of marl	8
Waters	15	Samples of limestone	4
Butters	3	Samples of clay	2
Fertilizers	7	Analyses of fertilizers for Association of Official Agricultural Chemists:	
Jamaica sugar-cane analyzed at New Orleans	204	Fertilizers and pure salts, nitrogen and ammonia	109
Sugars and sirups analyzed at New Orleans	187	Watermelon, albuminoids	16
Potash determinations for the Association of Official Agricultural Chemists	63	Soil, nitrogen and ammonia	5
Analyses of watermelons, cantaloups, etc.	208	Apples, albuminoids	47
Analyses of apples and dried apples	224	Sorghum, albuminoids	36
Analyses of sugar beets	432	Honey, albuminoids	133
Honey analyses	32	Sugar-cane, albuminoids	35
Dextrine experiments	50	Butter, albuminoids	93
Koumiss analyses	10	Blood, ship stuff, etc., albuminoids	16
Sugar analyses	27	Cactus, albuminoids	10
Do	35	Wheat and flour, albuminoids	55
Ash determinations	102	Barley, albuminoids	12
1 sample of "rex magnus"	1	Wheat and barley, weight per bushel	21
1 complete fertilizer	1	Barley, weight per 100 grams	12
1 water analysis	1	Barley, mealy	84
Kjeldahl experiments	28	Milk, albuminoids	205
Potash experiments	16	Milk, ash	35
Moisture determinations	6	Mustards, albuminoids	11
Sodium determinations	1	Black pepper, albuminoids	12
1 complete soapstone	1	Red pepper, albuminoids	3
Moisture and honey	63	White pepper, albuminoids	6
Ash in same	90	Cinnamon, albuminoids	14
Glucose in same	11	Ginger, albuminoids	7
Lactose in milk	4	Cloves, albuminoids	6
Moisture in sugars from New York custom-house	57	Mace, albuminoids	4
Moisture in koumiss	30	Nutmeg, albuminoids	4
Experiments to determine effect of bisulphite of lime on maple saps	10	Allspice, albuminoids	8
Sucrose in maple saps	14	Spices, ash	26
Moisture and ash in maple saps	65	Spices, moisture	26
Ash in maple saps	88	Wheat, gluten	36
Sugar in same	7	Miscellaneous, crude fiber	29
Limestones	16	Cotton-seed meal and soil, ash	22
Analyses of oatmeal and oat brand	21	Soil and scum, moisture	3
Total solids in mineral constituents in samples of water	18	Scum, phosphoric acid	4
Water and ash in melons and apples	341	Cereals, ash	69
Bases and acids in ash of the above	128	Cereals, moisture	69
Water and ash in California honey	126	Sucrose in sugar beets before and after inversion	20
Moisture in butter, lard, tallow, and imitation butter	124	Moisture and ash in sugar beets	60
		Phosphoric acid and magnesia	4
		Moisture in honey	63
		Ash in honey	90
		Glucose in honey	11
		Lactose in milk	4
		Moisture in sugar	

The average number of chemists employed in this division from January 1, 1886, to December 31, 1886, was nine and one clerk.

The following tables will explain the amount of work accomplished by this division for the year 1886:

	No.		No.
Butter:		Sample of fire-clay	1
Determinations of specific gravity	111	Complete analysis of peat moss	1
Determinations of salt	106	Moisture in butter, lard, tallow, and im- itation of butters	124
(Microscopic examination of all samples analyzed; slides prepared for photographic experiments in making microscopic tests with pure butter with addition of definite quantities of oleo fat and neutral lard.)		Lactose in milk	369
Sugar, determinations of limestone and press cake	203	Phosphoric acid, potash, and lime in fer- tilizers	49
Water, complete analyses	2	Analysis of samples of honey	296
Fertilizers, determinations	137	Analysis of samples of butter	259
Potash, determinations	15	Analysis of honey	136
Grain:		Analysis of sirups and sugars	26
Determinations of crude fiber	5	Analysis of sugar juices and sirups from Fort Scott experiments	958
Determinations of moisture and ash	6	Analysis of commercial fertilizers for the Association of Official Agricultural Chem- ists	24
Lots of mineral water examined and re- ported on	50	Miscellaneous	42
Complete analyses of waters	25	Curd determinations	55
Determinations of aluminum ores	9	Sugar analyses	32
Determinations of wall-paper	5	Fiber determination of Louisiana sugar- cane	10
Samples of baking-powders examined	5	Total solids in milk	84
Samples of spices	2	Kjeldahl experiments	166
Samples of whisks	2	Schälchen	175
Samples of marls	3		

In February Bulletin No. 11, being the second report of the experiments in the manufacture of sugar at Magnolia Station, Lawrence, La., was published.

	No.		No.
Meats, complete analyses	11	Tannin work on teas and spices	104
Analyses of apples, specific gravity, total solids; ash, moisture, malic acid	23	Fertilizers, soils and salts, nitrogen and am- monia	143
Samples of musk-melon, specific gravity of juice	26	Cerealine, albuminoids	14
Samples of water-melon, specific gravity of juice	56	Press cakes, albuminoids	21
Samples of limestone	10	Wheat, albuminoids	56
Analyses of butter and oleomargarine	55	Barley, albuminoids	2
(Analyses of fertilizers for Association of Official Agricultural Chemists:)		Sorghum and sugar-cane, albuminoids	156
Analyses of spices, volatile oil, fixed oil	217	Castor pomace, amides	11
Alcoholic extracts of pepper	15	Kaffir corn, albuminoids	2
Analyses of opium	1	Black pepper, albuminoids	9
Analyses of opuntia	9	White pepper, albuminoids	2
Samples of birch oil	2	Red pepper and mace, albuminoids	4
Water, ash, glucose, sucrose, specific grav- ity	68	Mustard, albuminoids	8
Water and ash in milk and creams	322	Ginger, albuminoids	14
Volatile matter in spices	116	Cassia buds, albuminoids	5
Water and ash in honey	76	Casava and olive-oil stone, albuminoids	3
Sugar, ash, total solids in nerve food	6	Cinnamon and allspice, albuminoids	4
Potash, committee samples, Association of Official Agricultural Chemists	30	Rice husks and liatris root, albuminoids	4
Potash in fertilizers	3	Wheat, weight per bushel	129
Water, glucose, sucrose in press cakes	76	Fertilizers, phosphoric acid	31
Glucose and sucrose in cane from Louisi- ana	93	Soils, moisture	3
		Sucrose in juices and sirups of Louisiana cane	156
		Sucrose in masse cuites	81
		Ash and moisture in sirups	54
		Sugar and beer	22
		Sugar and beer by Fehling's solution	22

The average number of chemists employed in this division from January 1, 1887, to March 1, 1887, is 3.3 and one clerk.

The work of the division for this time is set forth in the following statement:

The work pending on the 1st of March, 1887, consisted of various investigations of the adulteration of foods and condiments.

These investigations pertain to the examination of dairy products, spices, and condiments of all kinds, native wines, beers, ciders, and canned fruits, baking-powders, teas, coffees, and chocolates, flour and meal, sugars, molasses, and candies, and vari-

ous other articles; the results of these investigations being published in Bulletin No. 13, parts 1 and 11; several other parts of the same bulletin, treating of the above subjects, are now in course of preparation.

The amount of work accomplished up to April, 1887, is as follows:

	No.		No.
Analyses of malt liquors	252	Beer, albuminoids	34
Analyses of ciders	78	Beer, carbonic acid	27
Analyses of butters for the Treasury Department	10	Cider, ash	12
Analyses of opium for Treasury Department	4	Cider, solids	12
Fiber work on Cuban sugar-cane		Cider, lactic acids	12
Moisture, ash in teas	138	Cider, albuminoids	12
Soluble and insoluble tea leaf	12	Cider, carbonic acid	5
Effect of permanganate of potash on tea	157	Sugar in beer by polariscope	58
Opium, moisture	4	Sugar in beer by Fehling solution	58
Beer, ash	34	Sugar and glucose in Louisiana cane	22
Beer, solids	34	Moisture in spices	58
Beer, nitric acid	34	Ashes in spices	58
Beer, acetic acid	34	Starch in spices	23
Beer, phosphoric acid	34	Do	72
		Sugar and glucose in Cuban cane	12
		Starch in spices	24

During this year Bulletin No. 15, being the third report of the experiments in the manufacture of sugar at Magnolia Station, Lawrence, La., was prepared and published.

During all this time a large amount of the apparatus now on hand was devised and constructed by the division.

The constant attention of two and three helpers has been necessary to prepare the numerous samples for analysis and reduce them from the crude form as received by the division to such a state as to represent an average samples of their total bulk.

The above partially illustrates the method employed in the routine work of the division of chemistry. But there has been conducted by the division for several years extensive experiments in the matter of the manufacture of sugar from sorghum. Latterly these experiments have been confined to a process known as the diffusion process and the experiments extended to the sugar-cane as well as to the sorghum cane. It would be impossible to account for or describe in detail the vast amount of labor and time which must always be expended in an experiment of this magnitude. I beg to include herewith, as an example, some of the recent experiences in this line.

In 1884 an attempt was made to build a diffusion battery to be operated at Ottawa, Kans. The appropriation for this purpose did not become available until July 1, and although every effort was made to complete the machinery, it was not finished in time to be sent to Kansas before the close of the season. The misfortune of this delay could not be helped, any more than its far-reaching results could be anticipated and provided for.

In the spring of 1885 my immediate predecessor made a contract with the Pusey and Jones Company, of Wilmington, Del., to build a diffusion battery for use in Louisiana. A cell of this battery was exactly like those built for Ottawa. During the summer of 1885 the present Commissioner put forth every exertion in his power to complete the batteries both for Kansas and Louisiana, and the battery at Ottawa was put into condition for a preliminary trial just as the season closed. It was worked long enough, however, to show that diffusion was a success, 95 pounds of first sugar having been made per ton of sorghum cane. The opening at the bottom of the battery, however, was so small that it was found extremely difficult to remove the exhausted chips. So great was this difficulty that it was often half an hour from the time of commencing to discharge a cell until it was finished. That mechanical obstacles should be met with in a new process and with new machinery must be expected, and indeed it would be phenomenal to meet with success at the start. Since the battery which was in course of erection in Louisiana had the same kind of cells it was at once seen that it would be useless to attempt to carry out the experiments to a successful issue, and that any further expenditure of money under the same conditions would be without good result. The work of erecting the machinery was, therefore, discontinued, and the battery condemned and sold.

It was to overcome this mechanical difficulty that the Department decided to build a new style of battery, and this new form of apparatus has been completely successful.

It is proper to state that the first batteries built were modeled after the old style of beet-sugar batteries, and this is the reason of their failure. No one at that time knew how a cane battery should be built, and the contractors were left free to follow

any model that promised to be successful; but, as I have shown, as soon as the difficulties to be encountered were disclosed, the Department at once succeeded in overcoming them. And while the experiment has been expensive, yet the results attained with the perfected apparatus means so much to this country that even an expenditure of many hundred times the amount appropriated would still be insignificant when compared with what appears will be the final and gratifying result.

The methods employed in selecting the manufacturers of this last-named machinery will illustrate the general practice of the Department in similar cases, and are given herewith.

After due advertisement in the newspaper press the bids were opened by me, and were found to be as follows:

Sangerhauser Company, Sangerhausen, Germany.....	\$7, 147. 25
The Colwell Iron Company, New York, N. Y.....	12, 753. 00
The Pusey & Jones Company, Wilmington, Del.....	15, 000. 00
Rudolph Giebertmann, New Orleans, La.....	22, 700. 00

The lowest bid, from an American firm, was accepted and the work proceeded with.

In addition to the perplexities which the above but faintly outlines, there were additional considerations of a delicate character. How to secure to the Government the best return for its money, and how to select the sites for the experiments so as to avoid local jealousies and properly adjust individual aspirations free from any charge of favoritism, were questions to which I gave much thought. Happily two stations were found, one in Kansas and one in New Jersey, which were suited to the work. In Louisiana, however, the conditions were different and the situation more complicated. For the former experiments a plantation had been selected by my predecessor, who, without doubt, had good reasons therefor; but I determined to ask aid, in making up my decision, of the Louisiana Sugar Planters' Association, an organization thoroughly representative in character, and one whose action must be acceptable to all concerned. In response to my request this association interested itself in the matter, and I beg to append a certified copy of the minutes of the association, which explain themselves.

Mr. John Dymond, chairman of the committee on location of the diffusion or sugar experiment station, reported as follows:

"Whereas the Government of the United States has determined to test the practical effect of diffusion upon the sugar manufacturing interests of the country, and Hon. Norman J. Colman, Commissioner of Agriculture, accompanied by Chief Chemist Dr. H. W. Wiley, having come to Louisiana to arrange for a competitive test with the methods now in use in our State, and Commissioner Colman having requested the aid of the Sugar Planters' Association to select a locality for making the test, the association appointed the undersigned a committee for that purpose. We have, therefore, inquired into and examined all the places available under the conditions required by the Department of Agriculture.

"One of the principal considerations that has guided the committee in making the selection has been to choose that locality which has furnished the most favorable results under the old system, in order that the tests should be as severe, as thorough, as complete, and as decisive as possible. We have examined the various places seemingly available on the Mississippi River, and having carefully inquired concerning those in the Teche or Attakapas country, and after careful examination and thorough consideration, have determined to recommend Gov. H. C. Warmoth's Magnolia Plantation, in the parish of Plaquemines, as the most suitable locality, from the fact that it would afford the severest competitive test of any place in the State, as the yield on this plantation during several years has been greater per ton of cane ground than on any other place brought under our observation.

"MARCH 16, 1887.

"JOHN DYMOND, Chairman.

"D. F. KENNER.

"HENRY MCCALL.

"T. S. WILKINSON.

"L. C. KEEVER.

"W. B. SCHMIDT.

"J. C. MORRIS.

"W. C. STUBBS.

"Dr. William E. Birchell moved that the report be received and confirmed; which motion was unanimously carried.

"A correct copy from the minutes.

"J. Y. GILMORE, *Secretary.*"

"D. F. KENNER, *President.*

I will only add that the selection of the plantation referred to was determined upon, and the experiments will be conducted there.

Difficulties attending the collection of the information desired by you in such work as belongs to a chemical laboratory have been very great. It is quite impossible for me, considering the character of the work done, to give an opinion as to the comparative proficiency of the various methods employed. It is also unjust to judge of the amount of work which a chemist may do, as compared with that accomplished by another, without taking into consideration the character of the work in which the two are engaged. The completion of a single analysis in a certain line of investigation often requires more time and labor on the part of the operator than would be necessary to accomplish a hundred analyses of a different kind. While it is true that among eight chemists great differences of skill and industry may be found, yet I must be permitted to say, on behalf of those who are employed in the division of chemistry, that they have been industrious, earnest, and faithful, and have accomplished all that could be reasonably expected of them.

DIVISION OF BOTANY.

The form of some of the inquiries does not apply to the character of business in this division. There is but little, if any, "pending business," it being principally confined to such as can be disposed of from day to day, or within a few days at the most. The very small number of employes in this division, and the character of their work, does not admit of a detailed statement of its amount, nor of a comparison of the amount of work performed by each.

Believing that the spirit of the work will be answered by a general statement of the business and work of the division, and of the force employed during the period stated, I offer the following:

The business and work of the division consists essentially—

1st. Of investigations regarding the vegetable productions of the country, especially of such as have economic uses, of such as are the subjects of cultivation in agriculture and grazing, and of such as require consideration on account of interference with the work of the farmer and stock-grower, or of such as are obnoxious on account of hurtful properties.

2d. To conduct such correspondence as is assigned to this division, and to prepare material for publication in the annual and special reports.

3d. To care for, preserve, and improve the botanical collections and the herbarium and museum of the department.

4th. The force employed in the division from the 1st day of January, 1884, until the 1st day of July, 1886, was—

One botanist.....	\$1,800
One assistant botanist.....	1,200
One female clerk detailed for work in the division. One female clerk.....	600

5th. From the 1st of July, 1886, to the present time the force of the division has been increased through an appropriation for the investigation of the fungus diseases of plants, as follows:

One special agent.....	\$1,500
One assistant.....	1,200
One assistant.....	1,000

6th. As to time, the employes of this division have been regular in their attendance, only the usual allowance of thirty days annually for leaves of absence, together with occasional absences on account of sickness, having been allowed.

7th. As an indication of the character of the work of this division, and the manner of transacting the same, the following copies of letters of inquiry and replies thereto are hereto appended:

A correspondent from Russellville, Ark., writes: "I send you by this mail a package of what is known as the Japan clover in this locality, and generally as 'What is it' in other portions of the State. It has made its appearance in such a quiet, unobtrusive manner that it has secured a firm foot-hold in our woods, old worn and turned out fields, and along our roadsides; in fact, it may be found in full possession of our abandoned fields; horses, cattle, sheep, hogs, in fact the whole animal race eat it greedily, and such a thing as poor stock is not known where it grows. I have been scattering it by mail in localities where it is not established. The specimens I send you were dug in one of the roadways in my nursery where the ground was so hard I could not dig it with a spade and had to get a grubbing hoe. There was some there last season. I do not know the plant, nor do I know any one who does. I have seen some parties who say they have observed it for three or four years. I first observed

it two years ago while collecting the Arkansas fruit exhibit for New Orleans. I found it extending along the line of the I. M. and S. R. R. for a distance of about 100 miles, and about 125 on the Little Rock and Fort Smith. It may have extended further and probably did. Please give me its common and botanical name, and tell me what you know about where it came from, etc. We believe, at least I do, that it is or will be of incalculable value as a forage plant and in restoring our old fields. I saw a farmer cutting it for winter feed, and saw stalks of it 3½ feet long. It was the heaviest crop of grass I have seen in Arkansas.

The following answer was prepared in the division for the Commissioner's signature:

"Your letter of the 1st instant, together with the specimen of plant for identification, have been duly received and referred to the botanist of the Department, who reports that the plant is known in the Southern States as Japan clover. The botanical name is *Lespedeza striata*. It is a native of Japan, and by some means, probably through ship's ballast at Charleston, has been introduced into this country, and is now spread over all the Southern States. It is everywhere considered a valuable forage plant and should be disseminated. It is described and figured in the Agricultural Report for 1878."

The following inquiry came from Nassau, N. Y.:

"I herewith hand you some grass which came of spontaneous growth in the southern part of the State of Colorado. I am anxious to know the particulars of the same and any and all concerning its native place, also if the seed can be gotten in quantity."

The above was answered as follows:

"Your letter of the 26th ultimo, containing specimens of a grass from Colorado, has been referred to the botanist of the Department, who reports that the grass is apparently the same as is known in Colorado and the West as blue-stem, or blue-grass, or sometimes Colorado blue-grass. Botanically it is called *Agropyrum glaucum*. It is everywhere among ranchmen considered a valuable grass, next in quality to gramma or buffalo grass. It grows quite vigorously in low ground and is there frequently cut for hay. Indeed, its chief value is as a hay grass."

Yet another illustration is contained in the following letter from Esperanza Rancho, and the answer thereto returned:

"I have the honor to forward to your address a package containing some flowers, leaves, etc., of a plant that is giving stock in this county (Apache) no end of trouble and loss. It comes out in the spring at the first signs of warm weather and seems to reach its growth in a few days. The flowers are a beautiful purple and sometimes white or cream color. It grows everywhere, sometimes in clumps and often great patches of it for acres almost solid. Such places remind one very much of a field of red clover in the States.

"The plant remains green for, say, four or five weeks, when the seeds form, after which it dries up very quickly. The seeds are large and look like morning-glory seeds, being in pods or shells like the morning-glory. The plant is known to us as 'loco' or crazy-weed.

"Native cattle do not eat it at all, but imported cattle do not seem to know its properties and eat it greedily. They soon, in a week or ten days, show its effects by a great falling off in flesh, a loss of appetite, and extreme weakness. They are subject to fits of dizziness, when they will whirl around and fall down and stagger around without any apparent power to control their movements. It does not seem to affect either the bowels or kidneys, and we believe it to be a brain and nerve trouble entirely.

"The animal gradually gets weaker, and finally, in about three weeks, pegs out entirely. Horses have been known to be loosed the second and third times. This year half of the horses are laid up with it, and it is going to seriously cripple us for the yearly rounds.

"The whole country seems carpeted with the infernal purple blossoms. If you can suggest a remedy which would cure it, you would confer a most welcome blessing upon every cowman west of the Rio Grande, for the stock papers would scatter it far and wide."

Answer: "Your letter of the 20th instant, making inquiry concerning a 'loco' plant, with the accompanying specimens, has been duly received and referred to the botanist of the Department, who reports as follows:

"1st. The specimens sent are botanically called *Astragalus lentiginosus*. There are several species of this plant prevailing in different localities, but all having the same properties and effects. In Colorado and New Mexico 'loco' is *Astragalus mollissimus*; in Chihuahua, Mexico, it is *Astragalus Bigelovii*, and in southern California the species is the same as yours, viz, *A. lentiginosus*.

"2d. These plants prevail over such large areas that it is practically impossible to exterminate them. In Colorado for several years past the State has paid thousands

of dollars in premiums for the destruction of 'loco,' but without any apparent diminution of the supply.

"3d. No antidote to the effects of these plants on horses and cattle has been found. The only practical method of preventing the progress of the disease would seem to be taking up the animals on the first appearance of the disease and prevent their further access to the poisonous weeds. This method, of course, would make it necessary to provide a stock of fodder for such cases."

SECTION OF VEGETABLE PATHOLOGY.

This section was established July 1, 1886; therefore referring to earlier dates can not be considered.

The character of the business of the section is chiefly scientific, and relates to the investigations of the fungus diseases of cultivated plants, and the making of experiments to determine suitable and efficient remedies for these diseases. It is also the duty of this section to prepare for publication the results of the investigations and experiments performed, and answer by letter the queries of correspondence in its line of work. From this statement I think the impossibility of giving direct replies to the inquiries presented in your letter will appear evident.

Work of the kind indicated is very varied in its character, and methods of procedure can not be made to conform to any fixed routine, and the amount of work on hand at any one time is limited only by the ability of those employed. The whole subject is constantly before the section, and although its employes can do but one thing at a time, the accomplishment of one duty only opens a way for another, and in scientific and experimental work there is no end.

Upon the establishment of this section the force consisted of the official in charge and one lady clerk, whose regular appointment in the section was made August 1, 1886. A second clerk was assigned to duty in the section September 13, and on September 20 a scientific assistant was appointed temporarily to assist in performing experiments and in preparing reports.

The correspondence, the preparation of reports, and the general management of the business and work of the section devolves upon the officer in charge.

In the laboratory experiments are conducted in the preparation of reports or in answering the queries of correspondence. A full and minute record of all its operations and results is kept subject to call at any time. There are prepared such camera lucida sketches as will serve to illustrate the fungi under consideration. An inventory is here kept of all apparatus belonging to the laboratory, and requisitions are made for such as is needed. Information is also compiled from circulars of inquiry which have been sent out by the section. In addition to the force above referred to there are in the division, by detail, three clerks. The duties of this force are to prepare, mount, and care for specimens of fungi in the section's collection; to keep all the material readily accessible; to file, index, and care for correspondence; to keep an index by card of books and papers belonging to the section, and of both specimens of fungi and their hosts in the collection, and to make records of all additions thereto; to prepare indices of subjects and matters of interest to the section which appear in journals or other publications; to translate from the German such articles or papers as may be required for the use of the section; to act as type-writer operator, copying letters, reports, articles, and other necessary and useful matter for the section. The members of the force are all industrious, prompt, and constant in attendance, and faithful in the performance of their duties. They are constantly employed, but the character of their work precludes the keeping of a record of the amount of work accomplished each day. The labor of one day or of several days may appear very insignificant unless taken in connection with the results. In all scientific work days, and weeks even, may be spent in research that appears trifling in itself, but which, nevertheless, is necessary in the accomplishment of valuable results.

Previous to January 1, 1887, there was prepared by the section a report on the fungus diseases of the grape-vine. The diseases discussed in this report are the downy mildew, powdery mildew, black rot, anthracnose, grape-leaf blight, and grape-leaf spot, covering 136 pages of text, and illustrated by seven plates, three of which are colored. The report of the section for the annual report of the Department was also prepared. This covers 44 pages of printed matter, and is illustrated by eight plates. In the mean time material was being collected and investigations made for reports on other important plant diseases, such as the apple scab, potato rot, etc.

February 15 an order was issued for the preparation of a special report on the fungus diseases of the potato and tomato, with special reference to the rot of these vegetables. This report will embrace—

(1) A brief account of the potato rot in the United States from its first appearance.

(2) Special studies of the rot in the United States in 1885 and 1883, based upon replies to a circular of inquiry, including—

- (a) Geographical distribution, with maps.
- (b) Per cent. of loss by States (with illustrative charts), and the economic conditions connected therewith.
- (c) Relation of climate and rain-fall to the scourge.
- (d) Relative immunity of certain varieties and soils.
- (3) Full account (with plates and figures in text) of the fungi causing rot.
- (4) Such consideration of "scab" and other diseases as their importance merits.
- (5) Results that may be obtained by field experiments with remedies in 1887.

The above illustrates, in a general way, the plan of procedure in making reports on these subjects, Topic No. 3, calling for a "full account of the fungi causing rot," involves close observation and investigation with the microscope of the highest scientific character. This work is necessary in gaining knowledge of the nature and habits of these fungus pests. Before we can make an intelligent application of remedies we have to learn how the fungi came upon the infested plants, how they are propagated, what changes they pass through in their development, and how they maintain their existence from year to year, and finally all the circumstances which favor or which are unfavorable to their growth. What we have to obtain is an exact and complete knowledge of the fungi found upon cultivated plants, and with this knowledge determine how best their ravages may be prevented.

The number of letters received by this section up to March 1, 1887, not including the replies to circulars relating to grape-vine diseases (400) and potato rot (2,500), was 266, embracing queries or observations on the following subjects:

Pear blight, diseased orange-wood, black rot of the grape, apple-leaf fungi, mal-digoma of the orange, clematis disease, potato rot, coffee-leaf blight, strawberry rust, downy mildew of the grape, grape-leaf spot, black spot of rose leaves, diseased wheat, raspberry-leaf spot, potato scab, cotton rust, peach yellows, fungus diseases of the peach and cherry, disease of lettuce, diseases of egg-plant and tomato, apple-leaf rust, grape-vine diseases, smut of various grains, leaf-spot disease of bignonia, phyllosticta of the grape leaf, gooseberry blight, treatment of downy mildew and other vine diseases, anthracnose of the vine, cracking of pears, leaf diseases of pear and quince, fungi of maple and chestnut leaves, apple scab, diseased sorghum, diseased violets, corn smut, celery rust, fungus diseases of grasses, black knot, fungus on cedar, tomato rot, besides numerous purely scientific queries relating to the naming of species of fungi.

The officer in charge has also, by my direction, prepared lectures, illustrated by charts, on subjects relating to the work of the section, which he has delivered before the following-named societies: The Society for the Promotion of Agricultural Science, Buffalo meeting, August, 1886; New Jersey Horticultural Society, Trenton, New Jersey, December, 1886; Pennsylvania Horticultural Association, January, 1887; Western New York Horticultural Society, January, 1887, and the Monticello Wine and Fruit Growers' Association, Charlottesville, Va., February, 1887.

DIVISION OF STATISTICS.

(1) Amount and character of business pending in division January 1, 1884.

As the work of this division is not allowed to accumulate, but is disposed of as rapidly as it arises or is received, there was, on the 1st of January, 1884, no work pending in any of the sections beyond the regular routine work. The routine work on hand at that date was the preparation of the January and February report on Numbers and Values of Farm Animals, Progress on Cotton Marketing, Freight Rates of Transportation Companies, and other miscellaneous information. In preparing this report, there was used the results of the tabulated and extended returns from 1,716 correspondents, a statement of the agricultural statistics of Ontario condensed from the November report of the bureau of industries of the province, and returns of transportation rates from twenty-five of the leading railroads of the United States. In addition, there was given the results of an extended investigation by the statistician into the question of the aid to agriculture from other industries. The report was sent to the Public Printer on February 19, and contained 56 octavo pages. For a statement of the methods used in compiling this, as well as all other of the regular monthly reports, reference is made to the answer to question 11 in this report. The preparation of this report is given as pending January 1, because on that day it was the principal work being done in the division, but it was not work pending in the sense of unfinished or behind-hand.

With the explanation that there was no accumulation of work, the question as to the amount and nature of the work upon which was employed the clerical force of the division at that date will be seen to fall naturally under the second query, *i. e.*,

- (2) Amount and character of work received and disposed of in the division during the calendar year 1884, with amount pending and undisposed of January 1, 1885.

A statement of the work done is identical with a statement of the amount received or required of the division.

During 1884 the division issued eleven monthly reports, containing an aggregate of 603 pages. These reports contain results of investigations into the number and value of farm animals, made in January; into the acreage, condition, product, and values of the principal farm crops of 1884, made each month of the year; as well as a great variety of other miscellaneous statistical information, compiled from various sources. In the preparation of these reports 16,419 returns of correspondents were received, compiled, and the information contained therein digested and written up.

The annual report of the Department for 1884, containing 581 pages, was edited and the entire proof read in the division. In this volume the report of the statistician contains 148 pages of miscellaneous statistical information of an agricultural nature, including tables showing the acreage, product, and value, the yield per acre, value per acre, and value per unit of quantity of the principal crops of 1883, by States, in addition to a variety of other home statistics. It also contains twenty-seven diagrams, illustrating graphically facts of interest to agriculturists.

A resolution of the United States Senate, passed February 26, 1884, directed that the Commissioner of Agriculture furnish that body—

"*First.* The annual amount of wheat, rye, corn, and cotton produced in this country during the five years preceding 1882; the amount used at home as food, fodder, seed, and other purposes; the amount exported abroad, with the surplus, if any, at the end of the said crop years, each, respectively.

"*Second.* The amount produced in the crop year 1882; the amount and uses to which they were applied at home; the amount exported abroad, with the surplus, if any, in this country at the end of that crop year, each, respectively.

"*Third.* The amount produced in 1883; the amount already consumed at home, with the requirements in this country, and for what purposes, to the end of that crop year; the amount already exported, and the amount available for export before the crops of 1884 are ready for market, each, respectively.

"*Fourth.* The condition of crops now in the ground, with the extent and character of injury to the crops of 1883, each, respectively.

"*Fifth.* Whether, in his judgment, speculations in options or futures in these products, where no actual transfer of the property takes place, tends to influence its market value to the injury of producers or consumers."

In response to this resolution an exhaustive answer to these queries was prepared in this division and submitted to the Senate, by which body it was printed as Ex. Doc. No. 137, Forty-eighth Congress, first session.

The correspondence of the division is very large, and includes the results of compilation from records and from original research and investigation, for Congressional committees, members of Congress, officers of other Departments, editors, authors, commercial organizations, foreign and domestic statisticians, and general correspondents. There were prepared and sent out during 1884 3,268 letters upon an almost endless variety of subjects.

The division had, upon an average, a correspondent in some eighteen hundred counties during the year, each correspondent in turn having three assistants. To each of these correspondents there were sent monthly five crop-report blanks, and as they made requests stationery and postage were furnished them. Franks were written each month for the sending to the correspondents copies of the monthly reports; other sets were prepared for mailing to them and their assistants copies of the Annual Report of the Department and a small supply of seed. The monthly publications of the division in 1884 amounted to an aggregate of 134,000 copies, and nine-tenths of these were distributed under franks written in the division.

On the 1st of January, 1885, there was no accumulation of undisposed work.

- (3) Amount and character of work received and disposed of during 1885, with amount on hand January 1, 1886.

The work of the division is in part represented by eleven monthly crop reports, containing an aggregate of 663 octavo pages for 1885. These reports treat of the number and value and average prices of live stock in the different States in January, acreage, condition, product or value of the crops of 1885 monthly, and contains besides a vast amount of statistical information of a miscellaneous character. That portion relating to current domestic agriculture is based upon 16,099 returns of cor-

respondents, and the reports of State agents who were in turn assisted by the monthly returns to them of from perhaps an average of 1,500 correspondents. They contain a monthly report on the condition of European crops during the year, and a monthly statement of the changes in rates of transportation of agricultural products on the principal railroads of the United States. In addition, they contain 80 pages of foreign agricultural statistics, representing almost all the civilized Governments of the world, compiled in this office mainly from original official reports of each country. Specially among these may be mentioned the results of the investigation into the live stock of the world, published in January; cereal supply of Europe, in March; European customs duties upon agricultural products, in May, and international dairy statistics, in August.

The annual report of the Department for 1885, which was edited and the proof of which was read in the division, contains 86 pages devoted to the report of the statistician, in which is given, besides the annual statistical tables, a variety of statistical information of interest to agricultural readers. The statistician also prepared a descriptive catalogue of the exhibit of the charts and diagrams by this division at the New Orleans Exposition, containing 42 pages of tabular matter, illustrated by 27 statistical diagrams. An extended investigation of the status of irrigation of the dry areas of the Rocky Mountain system was carried on, results of which are now being published by the United States Senate as a miscellaneous document, containing about 260 pages.

In response to a request from the Secretary of the Treasury, a report was prepared showing the number of sheep, and the quantity and average price per pound of the wool clip of the United States for 1885 and for previous years since 1860, together with statistics concerning the consumption of wool during that period.

The correspondence of the division during 1885 covered the same wide range as in the previous year, and varied but little in extent, there having been written 3,362 letters. It should be understood that in a statement of the division correspondence no account is taken of printed circular letters sent out, the number given being actual personal manuscript letters. Some of these communications, especially those in answer to inquiries from members of Congress, contain the results of extensive investigation, and the work of their preparation is not to be measured by their length.

During the year the division had an average of 1,900 county correspondents whose requests for seed, publications of this and other Departments as far as possible, stationery and postage for official use, and miscellaneous matters, were promptly attended to. The blanks upon which their monthly returns were made were folded and sent them to the number of 10,000 each month, and franks were written for mailing a like number of printed reports each month, as well as franks for the annual report of the Department and for the quota of seed furnished to each.

The aggregate number of all the reports published by the division during 1885 was 153,000, and of this number at least 130,000 were distributed under franks written in the division.

There was no accumulation of unfinished business on the 1st of January, 1886.

(4) Amount and character of work received and disposed of during 1886, with amount on hand January 1, 1887.

The published reports of the division for 1886 number 11 monthly reports, with an aggregate of 580 pages, the home statistics being based on 17,450 returns of county correspondents. These monthly reports are a regular series, the main topics which are treated being the same each year. In addition to the subjects which are presented in the answer to question three, these reports in 1886 contained a wide range of miscellaneous information. Among the extra investigations, the results of which are presented, may be numbered frauds upon farmers, or Bohemian oats and like swindles, in the March number; indebtedness of farmers, and foreign and domestic legislation relating to oleomargarine, in May; foreign trade of South America, in October; losses of swine by disease, and sugar production of the world, in December. These reports also contained a large number of interesting foreign statistical statements, which are translated, compiled, and condensed in this office from the official publications of the various Governments.

The annual report of the Department for 1886, which was edited and the entire proof read in this division, will contain in 100 pages the report of the statistician for the year. This is made up of the usual home statistical tables, with many miscellaneous, domestic, and foreign investigations and statements, the work in the preparation of which is in no wise to be measured by the number of printed pages.

On April 21, 1886, the House of Representatives adopted the following resolution:

"Resolved, That the Commissioner of Agriculture be, and he is hereby, directed to report to this House, at his earliest convenience, the amount of wheat and corn now on hand in this country, where they are located, with the probable home require-

ments of each until September 1, 1886, as compared with amounts on hand and domestic requirements at similar periods during the past five years; the number of acres of winter and spring wheat, each respectively, now in the ground to make the coming crop as compared with the past five years at the date of his report; the amount of wheat and corn, each, respectively, likely to be required by each importing country, with the surplus on hand in each exporting country, to supply such requirements until September 1, 1886; the amount of wheat sown in all other countries for this year's crop, with the probable surplus or shortage during the coming year. Said report to be confined to the questions asked in this resolution, and all of its statements of amounts to be given in bushels and acres, according to American measurements."

In response to this, the division prepared a very full report which was published as House Document No. 393, Forty-ninth Congress, first session. This report required an extensive research into the original official reports of the various Governments of Europe, as well as of the records of cereal production and consumption in our own country.

The correspondence for 1886 shows a marked increase over previous years, the total number of letters written in the division being 3,870, covering the same wide range of subjects as in 1884 and 1885.

During this year the division had correspondents in an average of 2,100 counties, whose many requests were promptly attended to, and to whom there were monthly folded and mailed 10,000 circulars for returns. Franks for mailing them copies of the monthly reports were also written, as well as for the annual report and supplies of seed, in round numbers amounting to 105,000.

The aggregate number of copies of all the monthly reports published during the year was 166,000, and the addresses for the distribution of the greater part of these were written in the division.

January 1, 1887, found no accumulation of unfinished work in the division.

- (5) Amount and character of work received and disposed of up to March 1, 1887, with amount on hand undisposed of at that date.

The division issued the regular report for January and February on the 12th of February, containing 56 pages and treating of the number and value of farm animals, cotton crop and its distribution, and freight rates of transportation companies, with a short chapter on the wool industry of the United States, and an extended tabular statement of farm animals of the world, taken in the main from the official returns of the various countries. In the preparation of this report there were received, tabulated, and used returns from 1,915 county correspondents, with reports from 24 State agents, who were in turn assisted by a corps of correspondents in each county of their respective States.

The miscellaneous correspondence of the division was represented by 176 letters, in addition to which letters were written to nearly the whole corps of county correspondents.

The proof of the annual report of the Department for 1886 was read in the office during the two months as fast as received from the printer. Twelve thousand franks for the distribution of circulars, reports, and seed to the correspondents were also written.

On the 1st of March, 1887, the work in which the division was employed was the preparation of the March report, the circular returns for which were being received and tabulated. This was not, however, unfinished business.

In answer to your sixth query, I beg to refer you to the answers to the preceding questions, which give an account of the aggregate work done in the division by all the employes during the calendar years mentioned, and to state that it is impossible with the means now at my disposal to ascertain from such records as have been kept (and for a portion of the time they are incomplete) the exact or average proportion of the whole that was disposed of by each employe each month during 1884, 1885, 1886, and up to March 1, 1887.

Question No. 7, relative to the number of employes in the division during each month in 1884, 1885, 1886, and up to March 1, 1887, is answered in tabular form in connection with the ninth query.

The remarks relative to question 6 apply with equal force to the eighth query. The work of this division is oftentimes very miscellaneous in its character, and during the year there are, at a very low estimate, fifty different kinds of work performed by the employes. The larger number of the clerks are trained to do whatever work may arise, none of them being confined to any one class of work.

- (9) Average number of days devoted to official business by the employes in 1884, 1886, and up to March 1, 1887.

I have arranged and herewith present a tabular statement showing the average number of employes in the division each month; the total amount of time lost monthly,

showing separately the days lost from sickness and the days lost from all other causes, including annual leave, excused, and leave without pay; the average number of days per clerk lost each month; the total time lost in the division, with the average per employé per month and per year, for the years 1884, 1885, 1886, and up to March 1, 1887.

The statement is as follows:

Months.	1884.					1885.				
	Clerks.	Sick total.	Per clerk.	Other total.	Per clerk.	Clerks.	Sick total.	Per clerk.	Other total.	Per clerk.
January.....	35	56	1.6	30	.9	40	75	2.4	8	.2
February.....	40	122	3.1	18	.5	47	74	1.6	29	.6
March.....	40	71	1.8	11	.3	45	133	3.0	66	1.5
April.....	41	47	1.1	32	.8	48	85	1.8	26	.5
May.....	28	46	1.6	55	2.0	45	83	1.8	25	.6
June.....	26	9	.3	54	2.1	39	65	1.7	43	1.1
July.....	36	41	1.1	99	2.8	47	54	1.1	97	2.1
August.....	36	56	1.6	176	4.9	49	62	1.3	388	7.9
September.....	40	55	1.4	158	4.0	51	113	2.2	417	8.2
October.....	39	49	1.3	167	4.3	53	98	1.8	177	3.3
November.....	41	64	1.6	69	1.7	55	104	1.9	124	2.3
December.....	40	75	1.9	71	1.8	51	143	2.8	92	1.8
Total.....	.....	691	.....	939	.....	.....	1,109	.....	1,492	.....
Average per month..	37-	58-	1.6	78+	2.1	48-	92+	1.9	124+	2.6
Average per year...	47-	.....	18.7	.....	25.4	48-	.....	23.1	.....	31.1

Months.	1886.					1887.				
	Clerks.	Sick total.	Per clerk.	Other total.	Per clerk.	Clerks.	Sick total.	Per clerk.	Other total.	Per clerk.
January.....	54	90	1.7	32	.6	54	106	2.0	57	1.1
February.....	55	161	2.9	45	.8	54	84	1.6	27	.5
March.....	55	134	2.4	44	.8	.....	.....	.....	.....	.....
April.....	53	93	1.8	69	1.3	.....	.....	.....	.....	.....
May.....	52	110	2.1	103	2.1	.....	.....	.....	.....	.....
June.....	53	131	2.5	130	2.5	.....	.....	.....	.....	.....
July.....	53	95	1.8	174	3.3	.....	.....	.....	.....	.....
August.....	56	145	2.6	428	7.6	.....	.....	.....	.....	.....
September.....	54	89	1.6	226	4.2	.....	.....	.....	.....	.....
October.....	52	71	1.4	111	2.1	.....	.....	.....	.....	.....
November.....	52	68	1.3	112	2.2	.....	.....	.....	.....	.....
December.....	54	106	2.0	228	4.2	.....	.....	.....	.....	.....
Total.....	.....	1,293	.....	1,707	.....	.....	.....	.....	.....	.....
Average per month..	54-	108	2.0	142+	2.6	.....	.....	.....	.....	.....
Average per year...	54-	.....	23.9	.....	31.6	.....	.....	.....	.....	.....

The above tables include leave taken by clerks without pay, as follows: In 1884, 19 days in August, 12 days in September, and 12 days in December; in 1885, 7 days in February, 10 days in June, 62 days in August, 111 days in September, 52 days in October, and 45 days in November; in 1886, 22 days in July, 45 days in August, 13 days in September, 10 days in October, and 10 days in December.

Taking these from the column of "other" in the above statement, the total days and yearly average of time lost other than by sickness, would stand:

Years.	Time lost.	Average per employé.
1884.....	896	24.2
1885.....	1,205	25.1
1886.....	1,607	29.8

(10) Maximum and minimum number of days devoted to official business by the clerk present the most and the clerk present the least during 1884, 1885, 1886, and up to March 1, 1887.

From the time record of the division the following statement showing the number of days lost in each year by the clerk losing the most and the clerk losing the least is made. As in the answer to question nine, all absence from desk while an employé, from whatever cause, is counted as "time lost."

Years.	Days lost by one clerk.	
	Greatest number.	Least number.
1884.....	101	15
1885.....	112	23
1886.....	111	20
1887.....	43	0

(11) A statement of the methods of transacting the business of the division, from its receipt to its disposal.

The division is divided into three sections, the principal work of each being distinct; the three uniting, however, in doing such miscellaneous work as arises. These sections, in the order of magnitude, are (1) crop reporting; (2) freight rates; (3) county correspondents. Each is under the charge of a clerk known as a section chief, and all are under the direct supervision of the statistician.

The first-named section has charge of the receipt and tabulation of the monthly crop returns of county correspondents, and all clerical work connected with that portion of the monthly report relating to crop conditions. In brief, this work of the section may be thus specifically noted: The points upon which a report is desired are determined by the statistician, who then prepares a circular which is sent to the Government Printing Office. Eleven thousand copies are usually printed, and when received are turned over to this section; here in the meantime a set of envelopes have been addressed to the county correspondents, and into these the circulars are placed with a return envelope addressed to the Commissioner of Agriculture, sealed and mailed. The mailing takes place about five weeks before the date set for the return, which is the first of each month. On about the 25th of the month, tabulated sheets are prepared as follows: Large sheets capable of holding the returns of ninety counties are ruled for each State, at the head of the columns being placed the questions which are to be answered that month. Correspondents are instructed to answer the queries in percentages, and these returns are transferred to the proper columns on the sheets. During the time in which the returns reach the Department, from the 28th of one month to the 7th of the next, mail is delivered to the section three times daily. Record books, dividing the States into four equal groups, are kept, and in these, as they are received, the circulars are credited to the correspondents. They are then turned over to the tabulators, by whom the returns are transferred to the proper column on the large sheet before mentioned. On these sheets, two averages are found for the State, the straight average and the true average. The first is found by adding the column and dividing by the number of returns. The true average is found by giving to each county making return its proper weight or relative standing in production of the crop under consideration. The following statement, supposed to be the return of condition of corn in five Illinois counties, will clearly illustrate the two averages and their differences:

County.	Condition.	Crop in census year.	Condition extended.
McLean.....	98	11, 976, 581	11, 737, 049
Alexander.....	65	454, 705	305, 558
La Salle.....	100	11, 148, 779	11, 148, 779
Hardin.....	70	306, 960	214, 872
Massac.....	67	450, 010	301, 507
Total.....	400	24, 337, 035	23, 707, 765
Average.....	80	.....	97.4

This extended or true average is thus worked out for each question and each State, the number of inquiries varying each month from six to fifteen.)

When the returns have been transcribed the circulars are turned over to another set of clerks, who write off, under the proper head, any remarks the correspondents may make, arranging them by States and by subjects. On the 8th of the month the sheets are closed, averages struck, and, with the notes, turned over to the statistician. He goes carefully over each State separately, correcting or modifying the averages according to his judgment, after consulting the reports of the State agents, State publications, and all other available sources of information. When he has revised the sheets they are returned to the section, when the final averages for each State are transcribed to slips for each query, and a corrected average for the whole country worked out in the same manner as the corrected State average. These final results are sent to the statistician, who on the 10th prepares the synopsis of the report for the press, and on the 11th prepares the full report for the printer, the clerical work in this connection being done in this section.

In the appropriation for the fiscal year ending June 30, 1883, Congress required this division to collect and publish in the monthly reports the rates of transportation companies. This led to the establishment of the section of freight rates, which has entire charge of the collection and preparation for publication of these tariffs and changes. The routine work necessary in the collection of these rates is a letter to the general freight agent, asking for the rates of freight in operation upon the 1st day of the month, a blank form showing the points to and from and the articles upon which the rates are desired, with an envelope addressed to the Commissioner of Agriculture, in which said blank form is returned to this section. These rates are then compared with the rates reported the previous month, and if changes are found the rates are copied and put into shape for publication. The proof of this report when returned from the printing office is carefully compared with the original returns. Many of the railroad companies refuse to fill out the blank forms, but instead send their tariffs of freight rates with the classifications of freight, and from this the rates are worked out in this office. There is still another style of reporting the rates which some companies adopt, *i. e.*, they give as the basis the rate from Chicago to New York, or reverse, and to find the rates from other points a certain percentage of this basis is given.

This section also has charge of the State statistical agents of the Department, each being at the head of a corps of reliable correspondents, who make returns to the agent on the 1st day of each month. This requires the preparation and sending out to the agents, with a letter of instruction, about 3,000 circulars of inquiry each month. The returns from correspondents are tabulated by the agent, who makes such statements as will show both the local and general peculiarities affecting the agriculture of the State. The agents make these reports as soon after the 1st of each month as possible, not later than the 6th. These reports are corrected and tabulated, and their remarks are revised, condensed, copied, and put into shape for publication in the monthly report. The proof of this report is also carefully compared with the original. The agents are required to make such special investigation as may from time to time be desired.

The number of pages of printed matter prepared by this section and published in the monthly crop reports from January 1, 1884, to March 1, 1887, was 716, of which during 1884 there were 225; 1885, 228; 1886, 235; and during January and February, 1887, 28.

The section in charge of the county correspondents may be said to have been organized January 1, 1886. The clerks comprising it were prior to that date recorded in other parts of the division of statistics.

The section is charged with retaining and increasing the body of statistical correspondents, the aim being to provide one chief and three assistant reporters in every agricultural county in the United States. The names and addresses of only the chief reporters are enrolled on the books of the section. Their number was not far from 1,900, January 1, 1886, and something over 2,200 on March 1, 1887.

It is the work of this section to answer letters from these correspondents; to supply them with postage-stamps and stationery, keeping a record of quantity and dates of sending; to see that their requests for seed and the publications of this and, when possible, of any other Department of the Government are granted; to write prompting letters to those reporters who are late with their returns, and explanatory letters to those whose returns err from failure to understand the directions; to see that the blank circulars for reports are correctly and promptly printed; to record the arrival of returns; to note changes in addresses of correspondents; to guard against diminution of the corps by neglect, removal, resignation, and death, and to enlarge its membership as the cultivated area is broadened. The enlistment and retention in service in this corps of such farmers as will make consecutive and intelligent reports requires constant attention. Vacancies are supplied mainly in two ways: Suggestions of an outgoing reporter whose services have shown an intelligent interest in the work, and,

in unrepresented counties, nominations by county officers, made at the Department's request.

In addition to the work mentioned, there is kept in this section a record of monthly prices of farm products, including animals and provisions, in ten of the principal cities of the United States. The business of the section is increasing, and the clerks are occupied, besides, in many other ways not mentioned, such as writing franks for the transmission of seed, reading proof, and other miscellaneous duties to its correspondents.

DIVISION OF GARDENS AND GROUNDS.

The nature of the work in the gardens and grounds is rather of a routine character, and operations proceed from time to time, and from year to year, and are at once fully disposed of when the time for their proper execution arrives. This may sometimes vary for a week or two, depending upon the weather, or the forwardness or backwardness of the season, but it is imperative that, when the proper time for its execution arrives, it has to be performed and not before.

It would not be an easy and probably not a profitable task to note day by day the amount and character of the work done by each employé, as so much of varied detail would be embraced. For example, two men are employed constantly in caring for the plants in the large conservatory. Of course their daily duties consist in watering the plants, repotting them when necessary, cleaning, staking, pruning, etc., also attending to ventilation, and, when required, the heating apparatus, together with such other work as the superintendent may direct in special cases.

The outdoor work is of similar character. This consists of the general care and keeping of the reservation, such as repairing roadways and walks, mowing the grass, pruning and cultivating the trees and shrubbery, and other items of detail which occur in reaching and maintaining the final result, viz: thorough and systematically well-kept grounds.

The propagating department, as to routine details, partakes of the same general characteristics.

Cuttings of plants are prepared at the proper time, as found best for each class, and they are at once placed in a suitable position to make roots, where they are manipulated and cared for until they are placed in pots, or otherwise disposed of, as best fitted to secure plants adapted to the purposes for which they are grown.

The employés work eight hours daily all the year round. In addition to the ordinary working days, two men are detailed each Sunday for the performance of such work as is unavoidably necessary in the glass houses. This duty or detail is filled by the employés in regular rotation.

As some recompense for this extra Sunday work, the employés understand that they can have two weeks' leave of absence yearly; a concession, which, by the way, they do not uniformly avail themselves of.

Such employés as are paid by the day receive pay only for the time they are at work.

As to the methods of transacting business pertaining to the practical work of this division, I would state that in all things connected with the general keeping of the gardens and grounds, time and methods of performing the work, the propagation and culture of plants, management of glass structures, and all details involved as above, is under the direct supervision of the superintendent, who is responsible to the Commissioner for the professional management and proper care of all public property connected with his charge and duties.

The method of distributing plants involves the following transactions: An order is made by the Commissioner on the superintendent, which calls, say, for twelve grapevines to be sent to an address in Guilford County, N. C. On receipt of this order the superintendent notes on its back the names of the kinds and the number of each variety which he may consider as being best adapted to, or worthy of trial, in that particular locality. This is then handed to the chief of the packing room, who, in due time, sees that the order is filled, properly packed, and mailed; noting also on back of order the date of mailing. This order is then returned to the superintendent, who has the transaction recorded, and the original order filed for preservation, which, as is seen, contains details of the whole transaction.

The reservation occupied by this Department contains about 35 acres, every foot of which requires cultivation and care, except such portions as are occupied by buildings. A large part of this area is disposed as ornamental grounds, comprising trees, shrubs, lawns, roads, and walks. The trees and shrubs, so far as space permits their presence, are arranged in accordance with their botanical classification, due regard being given to landscape-gardening effect. A formal arranged flower garden is suitably placed, which requires the propagation and pot culture of about 20,000 orna-

mental plants annually for its maintenance. The grass is kept as a closely mowed lawn, which involves cutting and dressing the whole at average intervals of ten days during the summer season.

About 3 acres of the area is devoted to the propagation and culture of outdoor plants.

The glass structures aggregate in length 680 feet, and cover a surface of about three-fourths of an acre. These include a conservatory 320 feet in length, which contains a large collection of economic plants.

One of the houses contains a large collection of choice foreign varieties of grapes, cultivated for the production of plants for distribution in localities throughout the States suited to their successful growth.

A large structure is devoted, at present, to the culture and propagation of a select assortment of pine-apples for distribution in southern Florida and southern California.

A collection of approved varieties of orange and lemon trees, imported mostly from Europe, are cultivated in a building specially erected for this purpose; these are also used for purposes of propagation.

Several additional structures are employed for the propagation and growth of various kinds of young plants.

The number of plants of all kinds thus propagated for general or special distribution does not vary greatly from year to year. A fair average may be taken from the following list available for this year:

(1) Ornamental plants propagated for the use of the gardens and grounds of the Department, 20,000.

(2) Economic plants propagated for general distribution:

Tea plants.....	9,900
Camphor plants.....	3,000
Olive plants.....	3,000
Date-palm plants.....	950
Mango plants.....	300
Pine-apple plants.....	250
Guava plants.....	200
Orange and lemon plants.....	850
Ginger plants.....	2,000
Strawberries.....	11,750
Fig plants.....	600
Loquat or Japan medlar plants.....	400
Grapes:	
Native variety plants.....	40,000
Foreign variety plants.....	1,509

The plants are distributed mainly by mail. They are carefully packed, and, to the best of my knowledge, not one in a thousand of the packages fails to reach its destination.

Each variety of plant is properly labeled, damp moss is inserted around the roots; this is first covered with oiled paper, then with strong wrapping paper securely fastened. An official frank, upon which the address is written, is then pasted on the package, and it is then ready for mailing.

This work, although shortly described, is rather formidable in its practical execution, requiring the labor of four expert packers for four months yearly.

The average number of employes in this division is eighteen. This includes two watchmen, who police the grounds day and night, and one boy messenger.

The duties of the superintendent consist in directing all details of work necessary in his division.

He also performs the functions of landscape gardener and engineer, garden architect and horticulturist, and as adviser on all questions relating to the cultivation of fruiting and other economic plants.

It is also part of his duties to suggest as to the introduction from foreign sources of such economic plants as may promise to be valuable in this country. Among others which have been introduced in this manner may be mentioned the Japan persimmon; the Navel orange from Bahia, now known in commerce as the Washington Navel; a collection of apples from Russia; Liberia coffee, which proved to be more tender than the Arabian; Eucalyptus globulus, or so-called anti-malaria tree; Cinchona succirubra, yielding quinine; Boehmeria nivea, producing the fiber known as Ramie; Phormium tenax or New Zealand flax, and many others of more or less importance.

The superintendent always prepares answers to questions asking for information or advice on subject-matters connected with his division. This official correspondence is not published in official reports of the Department, but it aggregates to work of considerable importance.

I beg to append examples showing the general character of this correspondence:

"I send you a slip from a newspaper which strongly advocates the introduction of the Mahwah tree from Africa as a sugar-producing plant of far more value than any sugar plant now in cultivation. Please send me some seeds or plants for trial here, or inform me where they can be procured." A. P., *South Carolina*.

Memorandum of answer prepared:

"The Mahwah tree, *Bassia latifolia*, is a native of Bengal and other highly tropical regions in the East Indies, and it is far from probable that it would flourish anywhere in the United States, but certainly it would not in the climate of South Carolina. The flowers of this tree are sweet to the taste and are eaten by the natives of Guzerat, and in other places where the trees abound. A fiery kind of spirits is also distilled from these flowers.

"The sugar of these flowers is mainly uncrystallizable. Analysis of sun-dried flowers yielded 56 per cent. of sugar and 15 per cent. of water; further analysis showed that sucrose (cane sugar) was only present in the proportion of 3 per cent., while glucose yielded 52 per cent. Hence it can not possibly be a substitute for cane sugar-bearing plants. Of nitrogenous matters the flowers contained 2 per cent. The usual proportion of useful nitrogenous food should have 1 part of flesh formers to 5 saccharine; but in the Mahwah flowers it was only 2 to 55, hence these have little of nutritious value."

Another quotation:

"I have seen it stated at various times that Eucalyptus globulus trees were planted in public grounds in Washington on account of their supposed power to prevent malarial emanations from the soil. Desiring to plant a shade tree in front of my house, I desire to ascertain whether the Eucalyptus is likely to thrive well in this climate." S., *York, Pa.*

Answer:

"The Eucalyptus globulus has not been planted in the public grounds in Washington.

"The tree is altogether too tender for this climate. It will not withstand more than 5 or 6 degrees of frost, and has been killed by cold at Galveston, Tex., and in Florida as far south as latitude 29°."

"Can Ramie be successfully grown in this State?" B., *New York*.

Answer:

"Ramie can be grown in New York State by lifting the roots during the fall and preserving them all winter, like potatoes. The fleshy roots can then be planted in spring, and produce a crop. But for commercial purposes this process would not be profitable, unless the profits on the crop were greater than they are at present.

"South of Maryland the plant occupies the ground like clover, and once planted needs no removal for many years, and will afford several cuttings during the summer."

"If possible, should like to be supplied with seeds of the black pepper tree or vine, from most northern latitudes where it flourishes. I would try the experiment of raising it in the warm valley of southern Oregon." A. C. P., *Pentland, Oregon*.

Answer:

"The black pepper vine, *Piper nigrum*, is a tropical plant, and therefore it would be futile to expect it to grow in any part of Oregon. It requires even a warmer climate than either the pine-apple or the banana, neither of which can be grown north of Florida."

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

I. This division was not established until July 1, 1886, and consequently had been in existence but eight months at the expiration of the period covered by your questions.

II. The function of the division, as defined by act of Congress, is "the promotion of economic ornithology and mammalogy; an investigation of the food-habits, distribution, and migrations of North American birds and mammals in relation to agriculture, horticulture, and forestry." The regular work of the division consists in the collection of facts relating to the above subjects, and in the preparation for distribution among farmers and others of special reports and bulletins upon birds and mammals which affect the interests of the farmer, and also upon the migration and distribution of North American species. Co-operation with the American Ornithologists' Union has been of the greatest assistance, since the vast quantity of original material accumulated by its large corps of trained observers has been turned over to the division.

At the commencement of the investigation of the food-habits of the various species, it became evident that the study of a bird's habits in the field must be supplemented by a critical examination of its stomach contents in the laboratory. Hence a collection of the crops, gullets, and gizzards of birds was begun. This collection now

numbers upwards of 5,000 specimens. The insect portion of this material is turned over to the entomologist for determination; the remainder is identified by the ornithologist and his assistants.

In order to obtain a large array of facts and in some cases the opinions of persons interested as well, the following circulars of inquiry were prepared, which, with the exception of the one addressed to rice growers, were sent to the secretaries of the various agricultural and horticultural societies throughout the country, to the agricultural press, and to a large number of farmers and ornithologists. The circular to rice growers was sent to the addresses of as many rice planters as the Department was able to secure, and to the editors of newspapers published in the rice-growing districts.

Following are copies of the circulars of inquiry issued by the division:

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

CIRCULAR ON THE FOOD-HABITS OF BIRDS.

It is well known that certain birds are directly destructive to farm crops, causing a loss of many thousand of dollars each year, and that others are highly beneficial, preying upon mice and insects which are injurious to vegetation, but the extent and significance of these effects, and their bearing upon practical agriculture, is little understood. Moreover, great difference of opinion exists, particularly among farmers, as to whether certain well-known species are on the whole beneficial or injurious; and many kinds which are really of great practical value are killed whenever opportunity offers. For example, hawks and owls are almost universally regarded as detrimental, while as a matter of fact most of them never touch poultry, but feed largely and some almost exclusively on mice and grasshoppers.

The wholesale slaughter of small birds has been known to be followed by serious increase of noxious insects; and invasions of insects which threatened to devastate large tracts of country have been cut nearly short by the timely services of some of our native birds.

In view of the above facts and many others which might be cited, it is clear that a comprehensive, systematic investigation of the inter-relation of birds and agriculture will prove of enormous value to farmers and horticulturists. Such an investigation has been undertaken by the newly-established division of Economic Ornithology of the Department of Agriculture, and the assistance and co-operation of persons interested are earnestly solicited.

The food of all birds consists either of animal matter or vegetable matter or both, and its consumption must be serviceable or prejudicial to the interests of mankind. Therefore, according to the food they eat, all birds may be classed under one of two headings—beneficial or injurious. Many species are both beneficial and injurious, and it is impossible to assign them to either category until the percentages of their food-elements have been positively determined and the sum of the good balanced against the sum of the evil.

In a very large proportion of our small birds the food varies considerably with the season, sometimes changing from vegetable to animal, or from injurious to beneficial. Furthermore, many birds feed their young upon substances which the adults rarely or never eat; and the young on leaving the nest sometimes greedily devour things which are discarded as they grow older. Hence it becomes necessary to ascertain the food of each species at different times of the year, and at different ages.

Information is desired on all questions relating to this inquiry, and special attention is invited to the following:

1. Has the common crow been observed to catch young chickens or to steal eggs?
2. Has it been observed to eat corn or other cereals in the field? If so, how long after planting, and how extensive was the injury done?
3. Has the crow been observed to feed upon injurious insects? If so, what kinds of insects were thus destroyed, and to what extent?
4. Has the crow blackbird or grackle been observed to carry off the young of the robin or other small birds, or to destroy their eggs?
5. When breeding near the house, has it been observed to drive off small birds (such as robins, bluebirds, etc.) which had previously made their abode on the premises?
6. Has it been observed to eat corn or other cereals in the field? If so, how long after planting, and how extensive was the injury done?
7. Has the crow blackbird been observed to feed upon injurious insects? If so, what kinds of insects were thus destroyed, and to what extent?
8. What birds have been observed to feed upon or otherwise injure buds or foliage, and what plants or trees have been so injured?
9. What birds have been observed to feed extensively upon fruit? What kind or kinds of fruit have been most injured by each species, and how expensive have been the losses thus occasioned?

10. The bobolink (ricebird or May-bird of the Southern States) congregates in vast flocks during its migrations and commits extensive depredations in certain parts of the South. The division will be glad to receive detailed accounts of these depredations from persons living in the affected districts, to whom a special circular will be sent on application.

11. What birds are considered to be injurious to grain crops, and what kinds are regarded as beneficial? On what facts are these opinions based?

12. What birds have been observed to feed upon injurious insects, and upon what kind or kinds does each bird feed?

13. Do blackbirds (other than the crow blackbird already mentioned) commit serious depredations in your vicinity? If so, which of the several species of blackbirds are concerned, and what crops are affected?

14. Has any kind of bird been observed to feed upon the honey-bee? If so, what species, and how extensive has been the injury done?

When possible, the exact date should be given of all occurrences reported.

Persons willing to aid in the collection of birds' stomachs will be furnished with the necessary blanks and instructions.

Special circulars on the English sparrow, and on the economic relations of mammals, will be furnished on application.

WASHINGTON, D. C., October 12, 1886.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

CIRCULAR ON THE ENGLISH SPARROW.

(*Passer domesticus*.)

The Department of Agriculture desires facts, from personal observation, in answer to the following questions concerning the European house sparrow, commonly called "English sparrow" in this country.

I. Is your locality city, suburb, or country?

II. Is the English sparrow present in your vicinity? If not, what is the nearest point at which you know it to occur? If present, when did it first appear?

III. Is it abundant and on the increase?

IV. Is it protected by law?

V. Is it artificially housed and fed?

VI. How many broods and young does a single pair rear in a season?

VII. Do any of our non-predatory birds habitually resist encroachments of, or attempt to drive off, the English sparrow unless themselves first attacked, and with what success?

VIII. Which of our native birds attempt to reclaim former nesting sites when these are occupied by the sparrows? State examples.

IX. Has the English sparrow been observed to molest or drive off any of our native birds? If so, what species are so molested or expelled from their former haunts?

X. Does it injure shade, fruit, or ornamental trees or vines?

XI. Does it injure garden fruits and vegetables?

XII. Does it injure grain crops?

XIII. Has any case in which it has been of marked benefit to the farmer or horticulturist come under your notice? If so, in what way has the benefit been derived?

XIV. Under what circumstances does it feed upon insects? What kinds of injurious or beneficial insects or their larvæ does it destroy, and to what extent?

XV. What means, if any, have been taken to restrict the increase of the English sparrow?

XVI. What is the prevailing public sentiment in respect to the bird?

Information is particularly desired concerning the presence of the English sparrow in the Southern States and in the region west of the Mississippi.

WASHINGTON, D. C., July 20, 1886.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

CIRCULAR ON THE ECONOMIC RELATIONS OF MAMMALS.

The Department of Agriculture desires information concerning the effects of mammals upon agriculture, and solicits replies to the following questions:

TO STOCK RAISERS ON THE FRONTIER.

1. Have you personal knowledge of one or more cases in which cattle, horses, sheep, or pigs have been killed or injured by bears, wolves, or panthers (known in the West as mountain lions)? If so, give full particulars.

TO POULTRY FANCIERS.

2. Have you personal knowledge of the loss of turkeys, geese, ducks, chickens, or doves from the attacks of predatory mammals? If so, how many and what kinds were killed on each occasion? In each case mention the animal by which you suppose the mischief was done, and your reasons for this belief.

3. What mammals, if any, steal feed put out for poultry?

TO FARMERS, FRUIT GROWERS, AND GARDNERS.

4. What mammals, if any, are injurious to grain crops in your neighborhood? In each case state whether the injury is occasioned directly by the consumption or the trampling of the grain, or by tunnels underneath the surface. Is the loss thus occasioned of trifling or serious consequence?

5. What mammals, if any, are injurious to fruit, and what kind or kinds of fruit are eaten by each species? Is the loss thus occasioned of trifling or serious consequence?

6. What mammals, if any, are injurious to vegetables, and what kind or kinds of vegetables are eaten by each species? Is the loss thus occasioned of trifling or serious consequence?

7. What mammals, if any, are injurious to meadows and pastures? In what manner are the injuries committed? Is the loss thus occasioned of trifling or serious consequence.

8. Are your fields subject to periodical invasions of meadow mice (*Arvicolæ*)? If so, can you give the exact date of one or more of such invasions?

9. What mammals, if any, are injurious to forest, shade, fruit, or ornamental trees or shrubs? What kind or kinds of trees or shrubs are injured by each, and in what manner and at what season is the damage done? Is the loss thus occasioned of trifling or serious consequence?

10. Have you personal knowledge of an instance in which cattle or horses have been injured by stepping into the burrows of woodchucks, muskrats, or badgers? If so, give particulars.

11. What mammals, if any, are beneficial to the farmer. In what manner are these benefits derived?

TO RICE GROWERS.

12. Are rats troublesome on your plantation? If so, are they injurious by feeding directly on the newly planted rice or by burrowing in the dikes, or both? Can you estimate the annual pecuniary loss thus occasioned?

13. Do any other small mammals affect the interests of the rice grower? If so, what kind or kinds, and to what extent?

TO HOP GROWERS.

14. What mammals, if any, affect the interests of the hop grower? In what manner and to what extent are these effects manifested?

MISCELLANEOUS.

15. Is the common mouse about dwellings, barns, and out-buildings in your neighborhood the white-footed or the house mouse, or are both present? In the latter case, which is most abundant? If uncertain as to the species, please send a specimen (the head will suffice) to the Department for identification.

16. What mammals, if any, injure or deface buildings, household goods, books, or papers?

17. What mammals, if any, injure canals or other embankments, dams, dikes, or drains? Is the damage thus occasioned of serious or trifling consequence?

18. In your opinion are moles beneficial or injurious? On what facts is this opinion based? (NOTE.—Meadow mice or "voles," must not be confounded with moles.)

19. In your opinion, are skunks beneficial or injurious? On what facts is this opinion based?

20. Do you know of one or more instances in which the increase of a species of economic importance has been limited by the abundance of its natural enemies? If so, give particulars.

In the Mississippi Valley, and the region between it and the Pacific, numerous small rodents called gophers do great damage to farms and crops. There are two principal kinds, *pocket gophers*, which live mostly under ground, and are characterized by external cheek-pouches and unusually large fore-claws (*Geomys* and *Thomomys*); and *gophers* or *ground squirrels* which live mostly above ground and have neither

external cheek-pouches nor claws of unusual size (*Spermophilus* and *Tamias*). Of these, the common little striped gopher (*Spermophilus tridecemlineatus*) and the large gray "line-tailed" Spermophile (*Spermophilus grammurus*) and its varieties are most abundant and widely distributed, and occasion the greatest losses to grain crops. Numerous other species, more or less local, affect the farmer's interests very appreciably.

Detailed information is desired concerning the habits and ravages of all these gophers. Such information should be accompanied by a specimen (a rough skin will suffice) for positive identification.

The above remarks apply with equal force to the various small mammals known as kangaroo rats and mice, pocket rats and mice, wood rats and mice, etc.

In answering this circular, please mention your occupation. If a farmer, state the size and character of your farm, and mention the principal crops which you cultivate.

Write your name and post-office address as plainly as possible.

WASHINGTON, D. C., October 30, 1886.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

INSTRUCTIONS FOR THE COLLECTION OF STOMACHS.

In investigating the economic relations of birds and mammals it is necessary to determine with accuracy the character of the food upon which the various kinds subsist. This is particularly important in the case of species which are known to exert an influence, beneficial or otherwise, upon certain farm and garden crops. Hence the Department of Agriculture desires to secure a collection of the stomachs and gizzards of our native mammals and birds, particularly of those which are supposed to affect agricultural interests.

METHOD OF PREPARATION.

All specimens should be preserved in 90 per cent. alcohol.

A stout paper tag should be attached to each stomach or gizzard by means of a strong thread or fine wire, which should be passed directly through its substance. Each tag should be numbered (in hard pencil) to correspond with the number given the specimen on the accompanying blank. Some birds, particularly in the breeding season, carry food in the gullet or crop. In such cases these portions of the alimentary tract should be preserved and should bear the same number that is given the gizzard of the same individual.

Stomachs of the following species are especially desired:

BIRDS.—Hawks, owls, crows, jays, blackbirds, cowbird, shrikes, cuckoos, Carolina dove, woodpeckers, quail, English sparrow, bobolink, or rice-bird, kingbird or bee-martin.

MAMMALS.—Fox, skunk, mink, weasels, badger, raccoon, opossum, squirrels, ground squirrels, gophers, mice, moles, shrews, bats.

In the case of mice, moles, shrews, and bats, the entire animal should be sent in order that the species may be fully identified.

A number of specimens may be preserved in a single wide-mouthed bottle or jar.

Persons willing to aid in the collection of stomachs will be furnished with blanks on which to record the necessary data.

Transportation charges will be paid by the Department.

Collections when ready for shipment should be carefully packed and sent by express addressed:

U. S. DEPARTMENT OF AGRICULTURE.

INVESTIGATIONS IN ECONOMIC ORNITHOLOGY.—CIRCULAR TO RICE GROWERS.

The Department of Agriculture desires the co-operation of rice growers in its attempt to secure trustworthy information concerning the extent of the injury annually done the rice crop by certain birds, chiefly the bobolink or rice-bird, and the red-winged black-bird; and in devising some measure or measures, consistent with reasonable economy, for the diminution if not the prevention of this loss.

Information in reply to the following questions is solicited:

1. Are you a rice planter?
2. If so, how many acres have you under cultivation?
3. What is the average yield of rice per acre?
4. What do you consider a fair estimate of the average annual loss per acre occasioned by birds?
5. Please cite a few extreme cases.

6. What percentage of this loss is due directly to the value of the rice consumed, and what indirectly to the cost of gathering and thrashing the worthless grain?

7. What is the average annual cost per acre of measures employed for the prevention or diminution of this loss?

8. In addition to the use of fire-arms and whips, what measures, if any, are employed for this purpose?

9. How many "bird minders" are employed annually upon your plantation during the fall invasion of rice-birds?

10. How many pounds of gunpowder are consumed annually during this period?

11. Is shot now used on your plantation? If so, in what quantity?

12. What kind or kinds of birds are most destructive to rice?

13. At what time of the year and for how long a period are these birds present?

14. What is the greatest number of rice-birds that you have known to be killed in a single season?

15. Does the rice crop on your plantation sustain a loss from the depredations of birds at the time of planting in spring? If so, what is the average loss per acre at this time?

Any information relating to the subject, though not covered by the above questions, will be thankfully received.

U. S. DEPARTMENT OF AGRICULTURE.

CIRCULAR TO POSTMASTERS IN RELATION TO THE ENGLISH SPARROW.

SIR: Is your locality city, suburb, or country? ————

Is the English sparrow present in your vicinity? ————

If not present, what is the nearest point at which you know it to occur? ————

If present, when did it first appear? ————

Remarks:

Name (write legibly), ————

P. O. address (please use office stamp here),



Date of mailing this circular,

Please fill and return in inclosed penalty envelope.

WASHINGTON, D. C., November 8, 1886.

Schedule No. 1.—Migration.

1887.]

[Light-House Division.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

BIRDS STRIKING THE LIGHT.

Number of station, ———. Name of station, ————.

Name and P.-O. address of keeper, ————.

Name of bird.	Date.	Hour of striking.	Birds striking lantern or tower.		Direction and force of wind.	Weather: Clear, fog, rain, or snow.	Remarks.
			Number striking.	Number killed.			

When the name of a bird is not known, please send its head and wings to the Department for identification, always stating date of striking. Such specimens may be sent post free in return penalty envelopes.

Under "Remarks" please state whether the birds strike on the north, south, east, or west side of the light.

Schedules filled during the spring migration should be returned in June; those filled during the fall migration should be returned in November.

Additional schedules can always be had on application.

Date of mailing this schedule, _____.

Schedule No. 2.—Migration.

1887.]

[Light-House Division.

U. S. DEPARTMENT OF AGRICULTURE, DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

BIRDS OBSERVED AT STATION.

Number of station. _____. Name of station, _____.

Name and P. O. address of keeper, _____.

Name of bird.	When was it first seen?	About how many were seen?	When was it next seen?	When did it become common?	When was it last seen?	Is it common or rare?	Does it breed near your station?	Remarks.

Please state the direction from which flocks of land birds usually come when approaching the station, and the direction they take when leaving the same. Is their course much influenced by the wind?

Schedules filled during the spring migration should be returned in June; those filled during the fall migration should be returned in November. Additional schedules can always be had on application.

Date of mailing this schedule, _____.

[On back of blank:]

INSTRUCTIONS.

In the *first* column should be stated the exact date when each kind of bird was first seen. This entry should be made on the day the bird arrives—not from memory afterwards (general statements such as “late in March,” “early in April,” etc., are of no value).

In the *second* column should be stated, with as much exactness as possible, the number of each kind of bird observed during the day it was first seen.

In the *third* column should be stated the date when the same kind of bird was next seen—whether this happens on the very next day, the next week, or not till a month later.

In the *fourth* column should be stated the date when the bird becomes common. Some birds come in a body and are common from the day of their first arrival, while others straggle along and are not common for a month or more; and others still are never common.

In the *fifth* column should be stated the last date when the bird was observed. In the *SPRING MIGRATION* this column will remain vacant in those species which breed in the neighborhood, as it can be filled only when *all* the individuals go north. In the *FALL MIGRATION* it should be filled in those species which pass father south, but must remain vacant in those which spend the winter in the vicinity of the station.

In the *sixth* column should be stated whether the species is abundant, common, tolerably common, or rare.

In the *seventh* column it is necessary only to say *yes* or *no*.

Schedule No. 3.—Migration.

1887.]

[Inland Division.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

BIRDS OBSERVED AT STATION.

Number of station, _____. Name of station, _____.

Name and P. O. address of observer, _____.

Name of bird.	When was it first seen?	About how many were seen?	When was it next seen?	When did it become common?	When was it last seen?	Is it common or rare?	Does it breed near your station?	Remarks.

Schedules filled during the spring migration should be returned in June; those filled during the fall migration should be returned in November. Additional schedules can always be had on application.

Date of mailing this schedule, _____.

[Indorsed on back:]

INSTRUCTIONS.

In the *first* column should be stated the exact date when each kind of bird was first seen. This entry should be made on the day the bird arrives—not from memory afterwards (general statements such as “late in March,” “early in April,” etc., are of no value).

In the *second* column should be stated, with as much exactness as possible, the number of each kind of bird observed during the day it was first seen.

In the *third* column should be stated the date when the same kind of bird was next seen—whether this happens on the very next day, the next week, or not till a month later.

In the *fourth* column should be stated the date when the bird becomes common. Some birds come in a body and are common from the day of their first arrival, while others straggle along and are not common for a month or more; and others still are never common.

In the *fifth* column should be stated the last date when the bird was observed. In the *SPRING MIGRATION* this column will remain vacant in those species which breed in the neighborhood, as it can be filled only when *all* the individuals go north. In the *FALL MIGRATION* it should be filled in those species which pass farther south, but must remain vacant in those which spend the winter in the vicinity of the station.

In the *sixth* column should be stated whether the species is abundant, common, tolerably common, or rare.

In the *seventh* column it is necessary only to say *yes* or *no*.

Schedule No. 4.—English sparrow.

UNITED STATES DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

SCHEDULE ON THE ENGLISH SPARROW.

(*Passer domesticus*.)

Name and P. O. address of observer (write legibly): _____.

Is your locality city, suburb, or country? _____.

Is the English sparrow present in your vicinity? _____.

If not present, what is the nearest point at which you know it to occur? _____.

If present, when did it first appear? _____.
 Is it abundant and on the increase? _____.
 Is it protected by law, State or municipal? _____.
 Is it artificially housed and fed? _____.
 How many broods and young does a single pair rear in a season? _____.
 Do any of our non-predatory birds habitually resist encroachments of, or attempt to drive off, the English sparrow unless themselves first attacked? _____.
 If so, what kinds, and with what success?

Which of our native birds attempt to reclaim former nesting sites when these are occupied by the sparrow?

Give examples.

Has the English sparrow been observed to molest or drive off any of our native birds? _____.

If so, what species are so molested or expelled from their former haunts? _____.

Does the English sparrow injure shade, fruit, or ornamental trees or vines? _____.

If so, give examples.

Does it injure garden fruits and vegetables? _____.

If so, give examples.

Does it injure grain crops? _____.

If so, give examples.

Has any case in which it has been of marked benefit to the farmer or horticulturist come under your notice? _____.

If so, in what way has the benefit been derived? _____.

Under what circumstances does it feed upon insects? _____.
 What kinds of injurious or beneficial insects or their larvæ does it destroy, and to what extent? _____.

What means, if any, have been taken to restrict the increase of the English sparrow? _____.

Please fill and return to

Dr. C. HART MERRIAM,
Ornithologist.

Date of mailing this schedule : _____.

Schedule No. 5.—Stomach blank.

UNITED STATES DEPARTMENT OF AGRICULTURE, DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

Stomach blank.—For the registration of data concerning stomachs, gizzards, crops, and gullets sent to the Department.

No.	Name of bird.	Sex.	Date.	Hour.	Locality.	Character of place where killed.	Collector.	Remarks.

IV. MATERIAL ON HAND.

The amount of material on hand pending and undisposed of January 1, 1887, consisted in replies to the above circulars; in material collected by the ornithologist, assistant ornithologist, and field agent of the division; in the material collected by the American Ornithologists' Union and its corps of nearly two thousand field observers, and kindly turned over to the division; in a collection of the stomachs and gizzards of birds; in the MS. of a report on Bird Migration in the Mississippi Valley, by W. W. Cooke; and in the MS. of a report on the Birds of the Pacific Coast Region, by L. Belding.

Following is a detailed statement of material on hand January 1, 1887.

On the English sparrow.

Returns from more than 3,000 persons in reply to circulars and schedules, and material turned over to the division by the American Ornithologists' Union.

On rice-birds.

Material collected by the ornithologist, assistant ornithologist, special field agent, and numerous rice growers (in reply to Circular No. 5).

On the crow, the blackbird, and other birds of economic importance.

Returns from a large number of persons in reply to Circular No. 1, and material contributed by the American Ornithologists' Union.

On the economic relations of mammals.

Replies from many farmers and others to Circular No. 3.

On the migration and geographical distribution of North American birds.

More than 10,000 pages of notes, contributed by about 1,500 observers.

Special reports.

On the birds of the Mississippi Valley (400 pages type-written, and about 300 pages still in manuscript).

On the birds of the Pacific coast (700 pages type-written).

Birds' stomachs.

Contents of the stomach of 5,000 birds, all in alcohol.

From January 1 to March 1, 1887, the material above specified was augmented by the receipt of additional replies to Circulars Nos. 1, 2, and 3, and by about 200 bottles of birds' stomachs.

V. THE ROUTINE BUSINESS OF THE DIVISION.

aside from the correspondence, distribution of circulars and schedules, and certain original investigations, consists in the collation and elaboration of the above-mentioned material, and in the preparation of the results for publication.

CIRCULARS AND SCHEDULES DISTRIBUTED.

The number of each of the several circulars and schedules distributed between July 1, 1886, and January 1, 1887, is as follows:

Circulars.

Food-habits of birds	4,000
English sparrow	4,000
Economic relations of mammals	2,500
Collection of birds' stomachs	600
To rice growers	600
Total	11,700

Schedules.

On the English sparrow	5,000
On migration	1,500
Stomach blanks	500
Total	7,000
Total of circulars and schedules distributed from July 1, 1886, to January 1, 1887	18,700

NOTE.—This number does not include circular letters, of which 2,397 have been sent out, making 21,097 in all.

Letters written.

July, 1886	329
August	290
September	486
October	183
November	127
December	292
Total for six months ending December 30, 1886	1,707

Letters answered by circular.

September (first used September 23).....	118
October.....	936
November.....	1, 196
December.....	147
Total.....	2, 397
Total of letters acknowledged from July 1 to December 30, 1886.....	4, 104

Early in the year 1887 the following circular was prepared, to accompany schedules 1, 2, and 3 (see pp. 13-15):

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

CIRCULAR ON THE GEOGRAPHICAL DISTRIBUTION AND MIGRATION OF NORTH AMERICAN
BIRDS FOR 1887.

Through the courtesy of the American Ornithologists' Union, the Department of Agriculture has secured the co-operation of this organization, and has undertaken to carry on the work begun by the Union on the migration and geographical distribution of North American birds.

The Department wishes to ascertain the whereabouts of all our birds during the winter season, and the times of leaving their winter homes; to determine, if possible, the number and extent of the chief avenues of migration in North America, and the average rate of speed at which the different species travel; to find out the dates of their appearance at and disappearance from at least a thousand localities, both in spring and fall, for a period of years; and to map out the *breeding areas* of every species which rears its young in North America north of Mexico.

In order to obtain this information it is necessary to secure the voluntary services of a large corps of observers, each of whom is requested to contribute as full data as possible concerning the questions mentioned in this circular.

The first item in an observer's report should be a brief but careful description of the principal physical features, including latitude, longitude, and altitude, of the locality which is the seat of his observations.

The data collected may be arranged conveniently in three general classes: *a.* Ornithological phenomena; *b.* Meteorological phenomena; *c.* Contemporary and correlative phenomena.

(*a*) *Ornithological phenomena.*

Each observer is requested to prepare, at his earliest convenience, a complete list of the birds known to occur in the vicinity of his station, and to indicate (by the abbreviations inclosed in parentheses) to which of the following five categories each species pertains:

1. *Permanent residents*, or those that are found regularly throughout the year (R).
2. *Winter visitants*, or those that occur only during the winter season, passing north in the spring (WV).
3. *Transient visitants*, or those that occur only during the migrations, in spring and fall (TV).
4. *Summer residents*, or those that are known to breed, but which depart southward before winter (SR).
5. *Accidental visitants*, or stragglers from remote districts (AV).

It is desirable also to indicate the relative abundance of the different species, the terms to be employed for this purpose being: Abundant, common, tolerably common, rare.

If you are in a position to observe the lines of flight of birds, have you noticed whether or not such lines are influenced by the topography of the country, and, if so, to what extent?

If a mountain intercepts the line of flight, what kinds of birds pass around it, and what kinds pass over it?

What localities in your neighborhood are sought as resting-places by the various kinds of migrating birds? Can you give any reason for this selection?

What kinds of birds generally move in flocks, and what kinds in pairs or singly?

Are you familiar with any kinds of birds in which the males and females, and old and young, fly in separate flocks? In many species the males arrive in advance of the females, hence it is important to note the sex of the first comers, and the date at which the opposite sex is first seen.

Have you observed from year to year any increase or decrease in the numbers of any kind of bird known to you? If so, do you attribute such change to altered conditions in the bird's breeding grounds? If not, can you assign a cause?

Have you observed the increase or decrease of one species to affect the numbers of another species? If so, can you explain the fact?

Has any kind disappeared altogether, and, if so, can you assign a cause for this disappearance?

Among the birds which are now common about your station is there any kind that was formerly rare or absent? If so, can you explain the fact?

Among the birds which breed regularly in your vicinity, have you ever observed an individual which by some personal peculiarity (such as the presence of white or dark feathers where they do not belong, or by some deformity) could readily be distinguished from others of its kind? If so, has this bird returned to the same place to nest year after year?

In recording arrivals and departures it is highly important to distinguish between the movements of irregular stragglers, of the advance guard or "van," and of the principal mass or "bulk" of the species. For this purpose observers are requested to note:

1. When the species is first seen.
2. When it is next seen.
3. When it becomes common.
4. When the bulk departs.
5. When the last individual is seen.

In addition to the above data, which *all* observers are requested to furnish, the Department particularly desires exact records of every increase and decrease in the numbers of a given species over a given area; for it is only by the knowledge of the daily fluctuations of the same species in the same place that the progress and movements of a "flight," or "bird-wave," can be traced. Such data can be contributed by experienced observers only, and in their procurement much time must be spent in the field. During the progress of the migratory movement the observer should go over the same ground day after day, and, if possible, both early in the morning and late in the afternoon. He should visit woodlands, thickets of dense undergrowth, and open fields; and, if possible, both swamp and upland should fall under his daily scrutiny.

The above may be regarded as *essential data*. There are many other noteworthy details that bear more or less directly upon the complicated problems involved in the study of migration. Among such may be mentioned the bodily condition of the bird (whether fat or lean), the molt, and the periods of song. The time of mating, when observed, should always be recorded.

The Department desires positive information concerning the food of all birds, and will furnish on application a special circular devoted to this branch of the inquiry.

(b) *Meteorological phenomena.*

Information is desired upon—

1. The direction and force of the wind.
2. The direction, character, and duration of storms.
3. The general conditions of the atmosphere, including rain-fall.
4. The succession of marked warm and cold waves, including a record of all sudden changes of temperature.

(c) *Contemporary and correlative phenomena.*

The Department desires that the data under this head be as full and complete as possible, and requests exact information upon—

1. The date at which the first toad is seen.
2. The date at which the first frog is heard.
3. The date at which the first tree-toad or "peeper" is heard.
4. The dates at which certain mammals and reptiles enter upon and emerge from the state of hibernation.
5. The dates at which various insects are first seen.
6. The dates of the flowering of various plants.
7. The dates of the leafing and falling of the leaves of various trees and shrubs.
8. The dates of the breaking up and disappearance of ice in rivers and lakes in spring, and of the freezing over of the same in the fall.

It must not be supposed, because a large amount of information upon a variety of subjects is asked for, that meager or isolated records are not desired. Quite the contrary is true. Comparatively few of the observers are ornithologists, or even bird collectors—the great majority being intelligent farmers, tradesmen, and light-keepers. Those who know only the commonest birds, such as the robin, bluebird, bobolink, martin, humming-bird, and chimney swift, can furnish important data, and their services are eagerly sought.

In order to secure better results, a portion of the territory under investigation has been divided into districts, each of which has been placed under the immediate direction of a competent superintendent. Observers not living within the limits of these several districts are requested to communicate with the ornithologist of the Department of Agriculture.

The districts, with their respective superintendents, are:

New England.—Superintendent, John H. Sage, Portland, Conn.

Atlantic district.—New York (excepting Long Island), Pennsylvania, New Jersey, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Kentucky, and Tennessee. Superintendent, Dr. A. K. Fisher, Department of Agriculture, Washington, D. C.

Long Island, New York.—Superintendent, William Dutcher, 51 Liberty street, New York city.

Indiana and Southern Michigan.—Superintendent, B. W. Evermann, Terre Haute, Ind.

Ohio.—Superintendent, Dr. F. W. Langdon, 65 West Seventh street, Cincinnati, Ohio.

Light-house division of North America.—Superintendent, Dr. C. Hart Merriam, Department of Agriculture, Washington, D. C.

Light-house division of Spanish America.—Superintendent, L. S. Foster, 35 Pine street, New York City.

Schedules on which to record the more prominent facts relating to bird migration will be furnished on application.

WASHINGTON, D. C., February 23, 1887.

From January 1 to March 1, 1887, about 2,000 circulars and 4,000 schedules were distributed, and 250 letters were answered. The annual report was written by the ornithologist and delivered to the Commissioner.

DETAILS OF OFFICE WORK.

The communications received consist chiefly of two kinds: (1) *letters* and (2) *replies to circulars*. Both of these are promptly acknowledged; the date of acknowledgment is stamped upon them, and the answers are copied in copy-books.

Disposition of letters.—If the letter contains information of use to the division, said information is copied on cards made for the purpose. Different colored cards are used for different subjects, as will appear from the attached samples. After this has been done, the letters are filed alphabetically under years.

1886.—Food of birds.

Passerina cyanea (Indigo bird).

WASHINGTON, D. C.

July 16, 1886.—Mr. H. W. Henshaw and I saw half a dozen indigo birds, all adult males, in the corner of an oat patch near a piece of woods, about 2 miles north of Washington, D. C. One was shot. Its gullet contained 4 entire grains of oats, and its gizzard was full of more or less broken oats and a few small seeds.—C. HART MERRIAM.

Arrivals.—Spring migration.

Corvus americanus (Crow).

LOCUST GROVE, NEW YORK.

Dates of arrival at Locust Grove, New York:

1870, March 2.

1880, February 4.

1881, February 16.

1883, February 20.

During the winter of 1881-'82, crows spent the entire winter at Locust Grove, the weather being unusually mild.—C. HART MERRIAM.

THE DEPARTMENT OF AGRICULTURE.

DEPARTMENT OF AGRICULTURE.

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

RICE-BIRDS.

Contains reply to Circular No. 5, and information upon:

ANSWERED:

By letter, book ———, page ———.
by circulars, Nos. ———.
by bulletin, No. ———.

REMARKS.

State:

Year:

County:

Post-office: ———, ———. No. ———.

Name of observer: ———.

DEPARTMENT OF AGRICULTURE.

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

ENGLISH SPARROW.

Contains reply to Circular No. 2, Schedule No. 4, and information upon:

Food of birds.
Rice-birds.
Migration.

ANSWERED:

By letter, book ———, page ———.
“ circulars, Nos. ———.
“ bulletin, No. ———.

REMARKS.

State:

Year:

County:

Post-office: ———. No. ———.

Name of observer: ———.

DEPARTMENT OF AGRICULTURE.

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

STOMACH BLANKS.

Contains collectors' data relating to stomachs, gizzards, crop, sand gullets sent to the Department.

ANSWERED:

by letter, book ———, page ———;
by circulars, Nos. ———;
by bulletin, No. ———.

REMARKS.

State:

Year:

County:

Post-office: ———. No. ———.

Name of observer.

DEPARTMENT OF AGRICULTURE.

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

MAMMALS.

Contains reply to circular No. 3, and information upon:

ANSWERED:

by letter, book ———, page ———;
by circulars, Nos. ——— ———;
by bulletin, No. ———.

REMARKS:

State:

Year:

County:

Post-office: ——— ———. No. ———.

Name of observer: ——— ———.

DEPARTMENT OF AGRICULTURE.

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

BIRD MIGRATION.

(Inland division.)

Contains reply to circular ———; schedule No. 3, and information upon:

Food of birds.
English sparrow.
Rice birds.
Breeding.
Winter birds.
Mammals.
Reptiles.
Batrachians.
Plants.
Weather.

ANSWERED:

by letter, book ———, page ———;
by circulars, Nos. ——— ———.
by bulletin, No. ———.

REMARKS.

State:

Year:

County:

Post-office: ——— ———. No. ———.

Name of observer: ——— ———.

DEPARTMENT OF AGRICULTURE.

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

BIRD MIGRATION.

(Light-house division.)

Contains reply to circular ———; schedules Nos. 1 and 2; and information upon:

Food of birds.
English sparrow.
Rice birds.
Breeding.
Winter birds.
Mammals.
Reptiles.
Batrachians.
Plants.
Weather.

ANSWERED:

by letter, book ———, page ———;
by circulars, Nos. ——— ———;
by bulletin, No. ———.

REMARKS:

In order to facilitate work, and at the same time to render the material more easily available for ready reference under its several headings, the following stamps are employed. They explain themselves:

Answered	Economic Ornithology.	Nesting.
April 20, 1887.	Ornithologist.	Mammals.
Division of Economic Or-	Adirondaacks.	Botanical.
nithology.	1884.	Entomological.
Washington, D. C.	1885.	Meteorological.
Copy.	1886.	Reptiles.
Copied.	1887.	Batrachians.
Acknowledged.	No circular.	Sing Sing, New York.
Correct.	Food of Birds.	
Examined.	Ornithological.	
American Ornithologists'	Spring Migration.	
Union.	Fall Migration.	

All of the information of value to the division is finally copied on the type-writer and arranged under particular species, for publication in special bulletins. Following are examples:

NEW YORK.—South Richland, Oswego, County. F. B. Rich.—Crows pull up corn when it is 2 or 3 inches high. I have known of many cases where the injury done was very extensive. Many farmers put tar on the corn when they plant it, so the crows will not eat it. I have noticed them catching grasshoppers, but not often. The greater part migrate, but some stay through the winter. They build their nests in high trees in the forests.

CALIFORNIA.—Chico, Butte County. William Proud.—The crow is very fond of corn. He pulls it out of the ground by the first blade that shows above the surface; the kernel at that time being soft is a delicious morsel. When the corn is in the milk or even ripe he will take it, whenever and wherever he can find it. The bird is also fond of wheat and other cereals. On the other hand, he has many good qualities. He is a great devourer of grubs, caterpillars, chrysalides, etc., including wire-worms, larvae of the cockchafer, beetles, army worms, grasshoppers, and other noxious vermin that falls in the way. Therefore I would say that the crow is beneficial to the farmer.

The following is in reply to the request for a statement of the method of transacting business, including one or more items, beginning with the receipt of the matter and showing in consecutive order the various steps taken, and the various employes

through whose hands the same passes; by whom it is considered and acted upon, and the action thereon had and taken by each until the same is finally disposed of:

METHOD OF DEALING WITH ENGLISH SPARROW RETURNS.

Filled schedules on the English sparrow, received by mail, are opened by the assistant ornithologist and looked over for points of especial interest or questions which might necessitate further correspondence with the writers. Any schedule requiring a special reply is laid aside until the others have been disposed of, when the proper letter is written or dictated to stenographer and type-writer. Schedules not needing special reply go at once to a clerk who acknowledges each one by a circular letter (see below*), stamping it accordingly, and indorsing it with the locality, date, and name of writer on the outside of folded schedule. When a considerable number of these have accumulated they are passed to a second clerk who provides each with a "jacket envelope" (for sample see page 23), on which is type-written the State, county, town, and name of observer, together with the kind of reply, and, if answered by letter, reference to the page of the letter copy-book in which the answer was copied.

Schedules thus jacketed pass to a special assistant, engaged in mapping the distribution of the sparrow, who numbers each schedule passing through his hands, and places the same number (in red or blue, according as the bird is present or not) on the map in the exact spot indicated by the schedule.

They are now returned to the clerk who first received them, and are arranged alphabetically by States and towns in a file case devoted to this material, the reports from each State, however, being divided into two sets, according to the presence or absence of the sparrow. In preparing for publication the information contained in these reports, each schedule is critically examined either by the assistant ornithologist or a special assistant, and referred to one or another clerk for copying or type-writing, according to whether the contained information is direct, simple, and clearly arranged, or whether, from its form and character, more careful discrimination and technical knowledge is required. The more complicated and important reports are examined and disposed of by the assistant ornithologist.

Information taken from the schedules is arranged for publication under eight different heads, as follows:

1. Time and manner of first appearance of the English sparrow; present abundance and apparent rate of increase; kind and degree of assistance and protection afforded or withheld by man.

2. The number of broods and young reared by each pair in the course of a season.

3. Relation of the sparrow to other birds.

4. Injury to trees or vines.

5. Injury to fruits and garden vegetables.

6. Injury to grain.

7. Relation to injurious or other insects.

8. Methods of restriction; suggestions for extermination; personal opinion; public sentiment; miscellaneous information.

The matter under each of these heads is taken out of each schedule and type-written on a slip or sheet by itself; each sheet bearing the name and post-office address of the observer, together with the date, place of observation, and number of years the sparrow is believed to have been present at that point.

The following example shows part of the information from one schedule, the slips ready to be cut apart:

OHIO. I. Cleveland (suburb), Cuyahoga County. L. M. Davies. The English sparrow appeared here in 1877, and is increasing. It is artificially housed and fed. November 1, 1886.

OHIO. II. Cleveland (suburb), Cuyahoga County. L. M. Davies. It rears three, sometimes four broods in a season. November 1, 1886.

OHIO. IV. Cleveland (suburb), Cuyahoga County. L. M. Davies. I have seen it picking buds from an apple tree. November 1, 1886 (nine years).

OHIO. VI. Cleveland (suburb), Cuyahoga County. L. M. Davies. In the fall all the young congregate and go into the country where they commit great depredations upon the grain-fields, especially fields of wheat. November 1, 1886 (nine years).

* U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY,
Washington, D. C., ———, 188—.

DEAR SIR: Your schedule on the English sparrow has been received and we are very much obliged for the information it contains.

All slips containing information in reply to the same question are filed together, and thus eventually all the evidence on any one head is brought together for study and comparison. The following is an example in reply to question number five:

- ALABAMA. V. Clayton, Barbour County. E. R. Quellin. It comes into the garden in flocks, eating the pease and tender fruit. October 20, 1886 (three years).
 CALIFORNIA. V. Redwood City, San Mateo County. H. Jacobson. Country. It feeds on grapes, figs, radishes, and lettuce. October 11, 1886 (twelve years).
 CONNECTICUT. V. New Haven, New Haven County. Louis B. Bishop. It injures grapes, pears, and lettuce. August 23, 1886 (ten years).
 KENTUCKY. Hartford, Ohio County. A. B. Baird. It destroys cabbage and radish seeds as they commence maturing. October 5, 1886 (six years).

This matter is arranged by States and is filed alphabetically by localities in each State. It is then condensed, revised, and finally copied for publication in a "bulletin on the English sparrow," which is now in an advanced state of preparation. The introductory portion of this bulletin will contain a synopsis of the principal facts brought to light by the investigation, together with deductions from the same, and suggestions to legislative bodies and to the people in regard to the best methods of abating the sparrow scourge.

In the treatment of the above described material, at least five persons have been employed; but since the total office force of the division consists of only six persons, and since the sparrow inquiry is but one of the several important investigations which are carried on simultaneously, it is seldom that sparrow material passes through all the stages of preparation without considerable interruption. The same is true of much of the other work of the division and for the same reason. The scope of investigation is so wide, and the number of employes so limited, that no rigid classification of duties has been possible, and it has been difficult to define with precision the limits to which any employe shall confine his or her usefulness. Nevertheless, the present disposition of forces gives fairly satisfactory results, and probably is as successful as any plan which can be devised without an unwarrantable increase in the number of employes.

Examination of the contents of birds' stomachs.

One of the most important branches of investigation undertaken by the division is the critical examination of the stomachs, gizzards, crops, and gullets of birds, already mentioned (see p. 2). The elaboration of this material is a slow process, requiring much technical knowledge, as well as patience, on the part of the investigator. An assistant ornithologist has devoted most of the present year (1887) to the study of the food-material found in hawks and owls. A single stomach sometimes contains representatives of several of the primary divisions of the animal kingdom. For instance, a hawk may contain at one time the remains of a meadow mouse, a sparrow, a snake, a frog, a grasshopper, an earthworm, and a snail—representatives of the seven primary groups, Mammalia, Aves, Reptilia, Batrachia, Arthropoda, Vermes, and Mollusca.

The results of this examination are summarized on cards prepared for the purpose, as may be seen from the attached examples. A separate card is used for each stomach.

Name: *Buteo borealis* ♀ Number 3926.
 Date: July 13, 1886. Where killed: Small wood.
 Hour of killing: 8 a. m.

Locality: Lockport, N. Y.

Condition of stomach: full. Condition of gullet: —. Percentage of animal matter, 100; of vegetable, —; of gravel, etc., —; of indeterminate, —.
 Contents consist of: 1 toad (*Bufo lentiginosus*).
 4 meadow mice (*Arvicola riparius*).
 2 small beetles (*Harpalus erythropus* and *Limonius spec.*).

Examination made by A. K. Fisher.
 Otto Leugger.

Date, April 7, 1887.

Lists of correspondents.

A card catalogue is kept of the correspondents of the division, and the cards are arranged alphabetically by *names of correspondents*. Attached is an example:

No. 354.

STEPHENS, F.
(ORNITHOLOGIST AND FIELD NATURALIST.)
Post Office: SAN BERNARDINO.
County: Do.
State: CALIFORNIA.

In addition to the above card catalogue, another card list is kept, arranged alphabetically by *States and counties*. This list contains, in addition to the name and address of each observer, a statement of the character and date of the material contributed, as may be seen from the attached example:

State: Pennsylvania. County: Chester.
Post office: West Chester
Name of observer: Dr. B. Harry Warren No. ———

Information contributed upon—	Year.									
Breeding	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893
Distribution	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893
English sparrow	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892
Food of birds	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892
Migration	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894
Rice-birds	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895
Winter birds	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895
Miscellaneous	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894

Distribution of documents.

So many requests are received for the publications of the Department, that a special circular has been prepared with blank lines for the name and address of applicant, and name and date of publication desired. These forms, when filled, are submitted to the chief clerk, who, after attaching his signature, passes them to the superintendent of the folding-room.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY,
Washington, D. C., April 15, 1887.

The following application for documents has been received from Amos W. Butler, Brookville, Ind., and is respectfully referred to the chief clerk.

C. HART MERRIAM,
Ornithologist.

Annual Report for 1886.

Forestry Report for 1884.

The superintendent of the folding-room will forward these documents under Department frank to the above address.

Chief Clerk.

Table showing total and average time devoted to business by employes in ornithological division from July 1, 1886, to March 1, 1887.

	No. of working days.	No. of days worked in person.	No. of days worked by proxy.	Total No. of days worked.	Average No. of employes.	Average No. of days' work.	No. of hours employed daily.	Maximum No. of days present.	Minimum No. days present.
July 1, 1886, to Jan. 1, 1887	153	709	0	700	6	116 $\frac{2}{3}$	6 $\frac{1}{2}$	153	133
Jan. 1, 1887, to March 1, 1887.	48	240	0	240	6	40	6 $\frac{1}{2}$	48	48*
Total	201	949	0	940	.....	.....	.....	.....	.....

* One employé was absent on account of sickness the entire two months.

Owing to the diversity and technical nature of much of the work of the division it is impossible to give a fair answer to the question asking for a statement of the amount and character of the work done by the employé doing the most and the employé doing the least. Moreover, owing to the necessary continuity of the several lines of inquiry carried on simultaneously by the division, no work save the ordinary office routine can be finally completed and disposed of until the same has been actually published. Hence it is impossible to answer the question asking for a statement of the amount of business disposed of at the several stated dates. The character of the business of the division has been already fully explained.

Appendix.—Work of the Department in economic ornithology prior to July, 1886.

The actual commencement of the work of the Department in economic ornithology dates from July 1, 1885, when, in obedience to an act of Congress, the investigation was begun as a branch of the division of entomology. The entire force comprising this section during the fiscal year ending June 30, 1886, consisted of but three persons, the present ornithologist (who has had charge of the work from the beginning), an assistant ornithologist, and one stenographer and type-writer employed by the day.

DIVISION OF MICROSCOPY.

During the present administration there has been an increasing demand for information relating to the work of general microscopy, a diversified field of labor, the value of which, as of scientific work in general, can not be estimated by the number of written pages, but by the practical value of the facts discovered.

Some investigations may occupy but little time, owing to their simplicity, while others may require weeks, months, or even years, before a satisfactory result is obtained.

Investigations are here made, in special cases, when required, for the several divisions of this Department, as well as for the Executive Departments of the Government, as the following examples illustrate:

At the request of the Secretary of the Treasury, a microscopical examination was made of sugar, supposed to have been artificially colored, for the purpose of evading high duties based on the "Dutch standard of color." The instructions were to determine whether the brown coloring matter constituted an impurity, the necessary result of manufacture, or had been applied artificially as a surface stain on a highly refined sugar, thus imitating an impure sugar with fraudulent intent. The microscopist claimed to have found that the sugar crystals were simply surface colored, and that the stains were easily removed by washes of sugar solutions.

Another illustration:

A correspondent wrote to the Commissioner that the orange trees were dying, in some sections of Florida, from a disease known as "die-back." Some specimens of the affected branches were referred to the microscopical division. The green bark of the smaller branches was found to be very much split, and covered with an orange-colored gum-like substance. The correspondent wished to know the cause of the disease, and a remedy for it. The microscopist demonstrated, he believed, that the oil of the tree had oozed through the ruptured bark, and becoming oxidized on exposure to the atmosphere had produced an orange-colored resin. Microscopic examination failed to discover the presence of fungi or insects on the branches. The further correspondence showed that the trees thus affected were confined to low, wet regions, and further events confirmed the investigation, for such trees, when transplanted to high grounds, recovered from this malady.

Another illustration:

At the request of the chief of the horticultural division, we examined a very destructive mildew growing on the leaves of foreign grape-vines in the conservatories of this Department. Investigations demonstrated that this was a mildew identical with that found on the foreign grape-vines grown under glass in this country, and which caused the destruction of the vintage of France and other European countries about the year 1850. This discovery enabled the growers of foreign vines in the United States to use remedies hitherto known and used in Europe. In addition to this there was found on the vines a higher development of the fungus (its higher fruit) not hitherto observed, as we believe, either in Europe or elsewhere. This discovery formed a long-sought and important link, which will be of great value. This investigation commenced in the summer of 1871 and closed in the fall of 1885, having been necessarily confined to the grape-growing season of each year.

Much work has been done in the line of food adulterations at the instance of the municipal authorities, and later, at the request of the Chief of the Bureau of Inter-

nal Revenue, chiefly relating to the detection of oleomargarine and imitations of butter.

"Store eggs" sold as fresh have been examined at the request of the police department, and were found in a state of incipient decay.

A number of samples of milk, cheese, butter, dried beef, and other substances have been examined and reported on, for the general public, and a constant line of investigations is being prosecuted in this division.

There was no *special and particular work pending or on hand*, other than the usual routine work of the division on the 1st day of January, 1884. Early in the month of January, 1884, a special series of experiments was begun, relating to the differentiation of butter, oleomargarine, and fats generally. This work has required constant attention for several months, an account of which and other experiments has already been published as a bulletin of the Department. In the month of June, said year, at the request of Mr. William Saunders, representative of the United States Department of Agriculture to the World's Industrial Cotton Centennial Exposition, New Orleans, La., the microscopist undertook the preparation of a comprehensive exhibit of water-colored drawings representing his work on fungi. This exhibit embraces over one thousand of the principal mycological species which prey upon living plants, or are otherwise prejudicial to their healthy growth; it includes also illustrations of the edible and poisonous mushrooms found in the United States. The collection has since been selected by Professor Baird for permanent exhibition in the National Museum. This work was pending on the 1st day of January, 1885, and so continued until March 1, said year, including the preparation of a comprehensive catalogue numbering some 29 printed pages.

From March 1, 1885, until January 1, 1886, the microscopist was exclusively occupied with investigations relating to food adulterations, especially that of butter and oleomargarine. The microscopist during this period, in addition to being present at several meetings of the Committees of Agriculture of the two houses of Congress, also prepared certain information relative to butter and oleomargarine, antecedent to the enactment of the oleomargarine law, involving the preparation of written statements and an examination of over eighty patents on file in the United States Patent Office, as also the translation of the official report of the French Academy of Medicine, on the use of oleomargarine in the insane asylums of the department of the Seine agreeable to an order from the minister of the interior.

From November, 1885, to July 1, 1886, a temporary assistant was assigned to this division, and on July 1, 1886, this assistant was duly appointed as such under the law, and attends to all the correspondence, translations, type-writing, etc., of the division. On the 15th of November, 1886, a second assistant was assigned and is still in the division, engaged on general work, making entries of experiments, etc. The assistant has lost but two days since her appointment. The same may be said of the second.

With regard to the method of transacting the official business of the division the following is an illustration:

A sample of butter-like substance to be examined is brought here by an official of the police department. On receiving the sample the officer is requested not to give any information as to the parties from whom it came. Should the substance prove to be butter the investigation is ended; but should it prove to be oleomargarine the proper police officer is informed. The assistant enters in a book kept for this purpose all the particulars and dates relating to the examination. Should the case be prosecuted, the microscopist is cited to appear and give evidence in the courts.

Another illustration:

March 10 of the current year, Capt. J. G. Walker, Chief of the Bureau of Navigation, sent two specimens of fiber and cellulose, desiring to know from what plant or plants derived, and to what localities indigenous. These were referred to the microscopical division. Understanding that the information sought was of great interest to the Navy Department the search was made exhaustive. Partly by the use of the microscope we traced the origin of the fiber to the palm family, and then procured specimens of every species of palm that could be found in the Government conservatories. Dried specimens were also obtained from the herbariums of the botanical division, museum of this Department, and the National Museum. Every specimen was placed in a separate envelope and marked according to its species. This being done, the literature of the subject was looked up and notes taken bearing on the subject from every treatise on palms and their economic uses to be found in the libraries of this Department, the National Medical Museum, and the Congressional Library. Each fiber was then dissected by special mechanical appliances, longitudinal and cross sections made in order that the microscopical characteristics distinguishing one species from another might be studied. This investigation is as yet incomplete, but enough has been accomplished to show that several species of the palm may furnish fibers suitable for the purposes required by the Navy Department.

DIVISION OF POMOLOGY.

Owing to the fact that the division of pomology was not established until July 1, 1886, it is impossible to report anything prior to that date.

The work of its organization began immediately after the pomologist had been commissioned, which commission was dated July 1, 1886.

From that date until January 1, 1887, there were no employés under his supervision, all the work being performed by the pomologist. The character of the work performed during that period by the pomologist consisted principally of correspondence with the fruit growers of the country concerning the best methods of organization of the work, and, under instructions from the Commissioner of Agriculture, the personal visitation of a few of the leading horticultural societies of the United States, for the purpose of collecting information of a pomological character.

Up to January 1, 1887, 240 letters had been written in search of information and in answer to inquiries concerning fruits. During the same period 24 packages of specimens of fruits had been received and examined. Many of these were sent with the request that the correct names should be returned for the benefit of those sending them. Drawings and written descriptions were made of such as were thought necessary for future study and comparison, and in some cases for publication in the annual report of this Department.

A sample of this work is herewith submitted. (See Exhibit A.)

On January 1, 1887, there was no work in this office undisposed of.

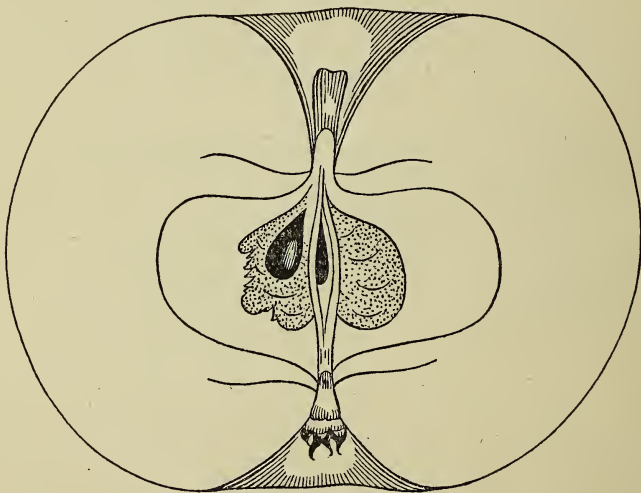
From January 1, 1887, to March 1, 1887, there were received 173 letters, all of which were answered, and in addition 45 letters were written in the pursuance of pomological investigations. There were also received during the same time 41 packages of specimens.

On the 1st day of February, 1887, one clerk was detailed for service in this division. He was engaged up to March 1, 1887, in compiling a list of the fruit growers of the United States.

All service by the Chief of the Division and by the clerk was performed in person.

No work remained undisposed of in this office on March 1, 1887.

EXHIBIT A.—Sample of work done.



MAMMOTH BLACKTWIG.

[Grown by N. C. Moore, of Boonesborough, Ark., crop of 1886. Drawn December 22, 1886.]

Mammoth Blacktwig.—Grown by N. C. Moore, Boonesborough, Ark. Crop of 1886. Size, medium; $2\frac{1}{2}$ to 3 inches. Shape, flat, conical, regular. Surface, smooth, yellow, almost covered with deep suffused red; not striped or splashed except very indistinctly. Dots, rather scattering; small, light, gray, prominent. Basin, shallow,

slightly folded, regular. Eye, small, closed. Cavity, deep, wide; deeply russeted and spread out over base. Stem, short to very short, slender. Core, wide, compact. Seeds, flat, light brown. Flesh, yellow, firm, coarse, juicy. Flavor, sub-acid, rich. Quality, very good. Season, December in Arkansas. Remarks: Resembles Winesap in color and flavor.

FORESTRY DIVISION.

The business of this division consists mainly in collecting and supplying information in regard to forestry matters.

The collection of information is done either through agents in the field, paid by the year or for special reports, by circulars of inquiry, or by consulting the literature on the subject.

The information thus collected is presented in the annual reports of the Department, in separate forestry reports, in answers to letters of inquiry, and in addresses delivered before horticultural and forestry and other associations.

The preparation of the annual report and of letters of information is the only routine business of the division.

All letters of inquiry referred to the division or directly addressed to the same, unless relating to matters like the forwarding of documents, of references, or of reiteration of general and customary replies, are attended to by the chief of division or by one of the assistants in the office, under the direction of the chief.

A record of the more important letters is kept in a letter-copy book; minor correspondence is simply recorded by date and address, and note of contents.

The answers to letters are prepared as soon after receipt as practicable, and are generally disposed of within two or three days, so that no business can be said to be pending at any time.

Applications for tree seeds, if they can be filled from stock on hand, are referred for action at once to the seed division, while letters of advice to applicants are prepared in this office.

The non-routine business of the division consists in the collection of information and the preparation of reports. The lines of inquiry having been decided upon, the methods and instructions to agents for special work are prepared by the chief of division and submitted to the Commissioner. Upon receipt of the reports of agents, for which a stated time is provided in their appointments, the same are read by the chief and accepted or else returned for amendment or enlargement, and when accepted they are prepared for publication by one of the assistants; and when so prepared or when called for, are submitted to the Commissioner for approval and publication.

Circulars of inquiry are prepared and sent out from the division, and the compilation of returns is made by one of the agents or clerks of the division, under the instruction and supervision of the chief of the division.

As the lines of inquiry are not yet definite ones, and the business of the division, in the main, is not of a routine nature, a strict organization of the force, up to March 1, 1887, has not existed; and being under the direct and personal supervision of the chief, no account of the daily work performed by each clerk has been kept, nor were any definite regular duties assigned to each.

The agents in the field are charged with the preparation of special reports, and are required to report progress monthly; the clerks are assigned their work from day to day or from time to time, according to the judgment of the chief and their capacity or the requirements of the office work.

A time record, denoting the attendance of the clerks is kept and reported monthly to the chief clerk.

The following is a detailed synopsis of the number of employes in the division during the term called for, their attendance, etc:

During 1884 there was one clerk employed at \$1,200, and three field agents at \$2,000 each. The amount of time lost by the clerk was twelve days on account of sickness.

During 1885 there was one clerk employed at \$1,200. In February there were six clerks detailed to the division and paid from the divisional fund \$600 each; in March there were eight such clerks at the same salary, and in April there were three at the same salary. There were also three field agents employed at \$2,000 each for January, February, March, April, and May. There were none employed in June. In July there was one employed at \$1,500 for twenty-eight days. In August there two such agents at the same salary for twenty-four days, and for the remainder of the year these two agents were continued in employment.

In 1885 the clerk lost ten days on account of sickness.

In 1886, with the exception of the month of August, there was employed one clerk at \$1,200. During the month of April there was an additional clerk employed at \$50 per month, and in May and June two additional clerks at the same salary. There

was also detailed to the division and paid from the divisional appropriation in April one clerk at \$40, two at \$55 each in May, six employes in June at \$45 each, and one in July at \$50. There were also employed in January and February two agents at \$1,500, and three agents for the remainder of the year at the same salary. There were also employed during the year twelve specialists engaged by piece work, whose aggregate pay was \$2,130. The amount of time lost was by the clerk at \$1,200, and amounted to nineteen days on account of sickness.

In 1887 (to March 1) there were one clerk employed at \$1,200 in January, and two in February. There were also employed three agents at \$1,500 each.

Besides the annual reports embodied in the reports of the Commissioner of Agriculture and the daily correspondence, which during the term from March 15, 1886, to March 1, 1887, necessitated the writing of from 1,500 to 2,000 letters, there was published from this division during 1884, Volume IV of Forestry Reports.

Since March 10, 1886, the following reports have been prepared or are under way:

1. Report on western tree-planting.
2. Report on the relation of railroads to forestry, with several appendices.
3. Report on the relations of wood manufactures to forest supplies.
4. Report on the relation of charcoal iron industry to wood supplies.
5. Report on the relation of the Government to forestry.
6. Report on the condition of Rocky Mountain forests.
7. Report on the biology of the white pine.
8. Report on the biology of the long-leaved pine.
9. Report on the biology of the bald cypress.
10. Report on the biology of the hemlock.
11. Report on the biology of western pitch pines.
12. Report on the influence of woodlands on waterflow.
13. Manual for willow culture.
14. Short biologies on the most important European timber trees which may be naturalized.
15. List of the important timber trees of the United States, with remarks as to their forestry.
16. Forest statistics of Tennessee.

SEED DIVISION.

No record has been kept in this division of the amount of business pending at any time, nor of the amount of business disposed of during any month or calendar year, but at the end of each fiscal year a report has been made of the aggregate amount of business transacted and disposed of during the year, and an abstract of the reports for the years above mentioned (so far as such reports have been made) showing the number of packages of seed put up and distributed, is herewith submitted. I have also to state that it does not appear that a record of the business transacted and disposed of by the individual employes in this division has been kept at any time.

The duties of said employes have been such, and the work in general so difficult to classify, that it has been found impracticable to keep such a record.

The following statement shows the aggregate distribution of seeds by the seed division of the Department of Agriculture during the fiscal years ending June 30, 1884, June 30, 1885, and June 30, 1886:

To whom issued.	Number of packages in year ending June 30—		
	1884.	1885.	1886.
Senators and Representatives in Congress	2, 912, 730	3, 600, 421	3, 538, 108
Statistical correspondents	357, 905	412, 609	224, 454
State correspondents	72, 450	104, 281	68, 442
Miscellaneous applicants	279, 653	550, 515	426, 251
Experiment stations and agricultural colleges			2, 871
Agricultural societies			7, 039
Total	3, 622, 738	4, 667, 826	4, 267, 165

The falling off in the total number of packages of seed distributed in the fiscal year 1885-'86, as compared with the distribution of the previous fiscal year, may be explained by the statement that in the fiscal year 1884-'85 427,514 papers of flower

seed and 135,301 papers of turnip seed (a total of 562,815 papers) were distributed in excess of the distribution of those two kinds of seed in 1885-'86. It may be stated in addition to the above, that in June, 1885, there was no turnip seed on hand in the seed division, so the distribution of seed in July and August following (the opening of the fiscal year 1885-'86) was delayed because of the necessity of buying and putting up turnip seed after July 1, and, in consequence, the distribution was not as large as it otherwise would have been.

The business of the seed division is to receive, keep a correct and classified list of, thoroughly test, and store away systematically all the seed purchased by the Department of Agriculture; to receive and care for all the miscellaneous supplies needed in putting up and distributing the same; to make paper pockets and cotton bags for the reception of seeds; to estimate the number of same requisite for each variety; to prepare copy for seed pocket labels, comprising the name of seeds, and, when deemed necessary, directions for planting and cultivation; to put up the seeds in quantities suitable for distribution; to prepare large numbers of packages of the various kinds to meet any exigency that may arise; to fill as received from the chief clerk of the Department the orders of Senators, Representatives, and Delegates in Congress; to address the required number of franks and postal cards; send seed to about 4,200 State and county statistical agents of the Department, to agricultural colleges and experiment stations, to granges and agricultural societies, to miscellaneous applicants throughout the entire country, and to such persons in foreign countries as desire to effect a change with this Department; to keep sets of books in which entries in detail are made of all seeds received and of all distributions (with the exception of those to members of Congress); to make up at the end of each fiscal year an alphabetically arranged statement, showing in full the quantities, species, and varieties of seed received by the division during the year, and a tabulated statement showing the distribution of seeds during the same period, and to do much other necessary work of such a character as not to be easily classed under any particular head, but none the less essential to the usefulness and efficiency of the division.

I would also state that the employes of the seed division have largely been appointed for limited periods, have been paid by the day, and for such time only as they have been on duty.

Taking these facts into consideration, it has been deemed unnecessary to make a statement showing the number of days devoted to business by the employes of this division during the years 1884, 1885, 1886, and during January and February, 1887. A statement of the average number of employes in the seed division during each month from January, 1884, to February, 1887, both months included, is submitted, also a sketch giving as nearly as may be done an idea of the multifarious duties performed by such employes from the moment the seeds reach the division in bulk until such time as a report in full of the distribution of them can be made to the Commissioner's office.

The following statement shows the average number of employes in the seed division, Department of Agriculture, during each month in the years 1884, 1885, 1886, and during January and February, 1887:

Months.	Average number of employes each month—			
	1884.	1885.	1886.	1887.
January.....	87	137	122	107
February.....	82	117	148	115
March.....	96	87	165	.....
April.....	67	57	102	.....
May.....	68	29	32	.....
June.....	48	24	27	.....
July.....	168	27	47	.....
August.....	204	60	102	.....
September.....	126	62	116	.....
October.....	129	73	111	.....
November.....	118	92	98	.....
December.....	110	100	100	.....
Monthly average.....	108 $\frac{7}{12}$	72 $\frac{1}{12}$	97 $\frac{1}{2}$	.....

I would respectfully call your attention to the fact, that in comparing the distribution of seeds in the fiscal year ended June 30, 1885, with that in the year ended June 30, 1886, the average number of employes in the seed division during each month of those years should be taken into consideration.

It appears that the average number of employes in the seed division during each month in the year ended June 30, 1885, was 108 $\frac{7}{12}$, and the average number of same

during each month in the year ended June 30, 1886, was $84\frac{1}{6}$; a decrease in the average number each month in the latter year, as compared with the former, of about 22 per cent.

The following statement shows the legal organization, the number and designation of officers and employes, their salaries, and appropriations from which paid, as shown by the records of the Department for March, 1887:

COMMISSIONER'S OFFICE.

One Commissioner	\$4,500.00
One chief clerk	2,500.00
One chief division of accounts	1,800.00
One property clerk	1,400.00
One clerk to disbursing officer	1,000.00
One stenographer	1,800.00
One engraver	2,000.00
Two clerks class 4, each	1,800.00
Two clerks class 3, each	1,400.00
Four clerks class 2, each	1,400.00
Seven clerks class 1, each	1,200.00
Eight clerks each	1,000.00
Six clerks each	840.00
One librarian	1,400.00
One engineer	1,400.00
Two firemen each	720.00
One assistant fireman	500.00
One superintendent folding-room	1,200.00
Two assistants in folding-room, each	600.00
One carpenter	1,000.00
Two messengers, each	720.00
One watchman	720.00
Eight laborers, each	660.00
One laborer	540.00
Two laborers, each	480.00
Two laborers, each	400.00
One laborer	300.00

DIVISION OF STATISTICS.

One statistician	2,500.00
Two clerks class 4, each	1,800.00
Three clerks class 3, each	1,600.00
Four clerks class 2, each	1,400.00
Five clerks class 1, each	1,200.00
Seven clerks each	1,000.00
Four clerks each	840.00
Two clerks each	720.00

EMPLOYÉS COLLECTING FOREIGN AND DOMESTIC STATISTICS, ETC.

One compiler	1,800.00
Three compilers, each	1,600.00
Two compilers, each	1,400.00
Three compilers, each	1,200.00
Two compilers, each	1,000.00
Three copyists, each	900.00
One copyist	840.00
One copyist	720.00
Twenty-five copyists, each	660.00

STATE AGENTS.

One agent in England	2,500.00
One agent each in California	1,200.00
Illinois	1,200.00
New York	1,200.00
Ohio	1,200.00
Indiana	900.00
Louisiana	900.00
Missouri	900.00

One agent each in Pennsylvania	\$900.00
Texas	900.00
Virginia	900.00
Kansas	720.00
Kentucky	720.00
North Carolina	720.00
South Carolina	720.00
Alabama	700.00
Georgia	700.00
Arkansas	600.00
Dakota	600.00
Iowa	600.00
Maryland	600.00
Mississippi	600.00
Florida	400.00
Minnesota	400.00

DIVISION OF ENTOMOLOGY.

One entomologist	2,500.00
One assistant entomologist	1,800.00
One assistant entomologist	1,600.00
One assistant entomologist	1,400.00

EMPLOYÉS INVESTIGATING HISTORY, ETC., OF INSECTS.

One investigator	1,800.00
One assistant investigator	1,200.00
One assistant investigator	900.00
One assistant investigator	480.00

SECTION OF SILK CULTURE—EMPLOYÉS ENGAGED IN "COLLECTING AND DISSEMINATING INFORMATION RELATIVE TO."

One special agent	2,400.00
One assistant	1,000.00
One director	1,000.00
One assistant director	450.00
One assistant director	400.00
Five assistant directors, each	240.00

DIVISION OF CHEMISTRY.

One chemist	2,500.00
One assistant chemist	1,600.00
One assistant chemist	1,400.00
Three assistant chemists, each	1,200.00
Two assistant chemists, each	1,000.00

EMPLOYÉS IN EXPERIMENTS IN THE MANUFACTURE OF SUGAR, ETC.

One assistant in laboratory	1,200.00
Two assistants in laboratory, each	1,000.00
One assistant in laboratory	840.00
One assistant in laboratory	600.00

DIVISION OF BOTANY.

One botanist	2,000.00
One assistant botanist	1,200.00

SECTION OF VEGETABLE PATHOLOGY.

One special agent	1,500.00
One assistant	1,000.00
One assistant	900.00

COLLECTING AND PREPARING SPECIMENS FOR THE MUSEUM.

One collector	600.00
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BUREAU OF ANIMAL INDUSTRY.

One chief of bureau	\$3,000.00
One clerk	1,500.00
One assistant	1,800.00
One assistant in laboratory	1,800.00
One veterinarian	1,600.00
One draughtsman	2,000.00
One agent	1,600.00
One copyist	1,000.00
One employé	900.0
One messenger	720.0
One laborer	600.00
One agent, per day	3.75

GENERAL FIELD AGENTS.

One agent	2,000.00
One agent	1,800.00
Four agents, each	1,600.00
Three agents, each	1,400.00
One agent	1,200.00
One agent	1,000.00
Two agents, each	900.00
One agent, per month	150.00
One agent, per month	80.00
One agent, per day	10.00
Seven agents, per day, each	8.00

QUARANTINE STATIONS.

One superintendent, Garfield, N. J.	1,800.00
One assistant, Garfield, N. J.	720.00
One laborer, Garfield, N. J.	600.00
One superintendent, Littleton, Mass.	1,800.00
Two laborers, each, Littleton, Mass.	600.00
One superintendent, Saint Denis, Md.	900.00

EMPLOYÉS GUARDING CATTLE QUARANTINED AT CHICAGO, ILL.

Fifteen guarders, each	1,000.00
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DIVISION OF FORESTRY.

One chief of division	2,000.00
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EMPLOYÉS IN "INVESTIGATION AND REPORT ON FORESTRY."

One special agent	1,500.00
One assistant	1,000.00
One assistant	900.00

DIVISION OF ORNITHOLOGY.

One ornithologist	2,000.00
One assistant	1,600.00
One assistant	1,500.00
One assistant	1,200.00
One clerk	660.00
One clerk	600.00

DIVISION OF SEED.

One superintendent seed division	1,800.00
One superintendent seed room	1,600.00
Four clerks, each	1,000.00
One clerk	840.00

EMPLOYÉS IN "PURCHASE AND PROPAGATION OF SEED."

One propagator	900.00
One laborer	720.00
One laborer	660.00
One laborer	240.00

LABORERS IN DISTRIBUTION OF SEED.

Eighty-nine laborers, each per day	\$1.50
One laborer, per day	1.25

DIVISION OF POMOLOGY.

One pomologist	2,000.00
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COLLECTION AND DISSEMINATION OF POMOLOGICAL INFORMATION.

One clerk	660.00
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DIVISION OF MICROSCOPY.

One microscopist	2,000.00
One assistant	1,000.00

MUSEUM.

One curator of museum	1,400.00
One assistant	1,000.00

WATCHMAN OF SEED DIVISION AND MUSEUM.

One watchman	720.00
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DIVISION OF GARDENS AND GROUNDS.

One superintendent	2,250.00
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EMPLOYÉS IN EXPERIMENTAL GARDENS AND GROUNDS.

One foreman	1,200.00
One skilled laborer	840.00
Four skilled laborers, each	780.00
Two skilled laborers, each	720.00
One laborer	660.00
Four laborers, each	600.00
One laborer	300.00

EMPLOYÉS IN PURCHASE, CULTIVATION, ETC., OF MEDICAL PLANTS.

Two skilled laborers, each	780.00
One laborer, per day	2.00
One laborer, per day	1.00

REPAIRING AND PAINTING GREENHOUSES.

One painter, per day	3.00
One carpenter, per day	3.00

REPAIRING DRIVES, ROADS, ETC.

One laborer, per day	2.00
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